ELECTRICAL WEST

May 1951
25 Cents

Organized for Disaster Relief, Page 67
Appliances, Page 87

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

Southern California

Edison Company's

Millionth Meter

A Milestone in the progress of Central and Southern California

Installed at the home of
Mr. and Mrs.
Dale B. Lillywhite
8652 La Tremolina Lane
Friendly Hills, Whittier
Thursday April 12, 1951

SOUTHERN CALIFORNIA EDISON COMPANY

GOLD SEAL OF CERTIFICATION IS ATTACHED TO EVERY CERTIFIED I-50 METER. EACH BEARS THE STAMPED APPROVAL OF THE FINAL INSPECTOR.

I-50 WATTHOUR METERS NOW CERTIFIED

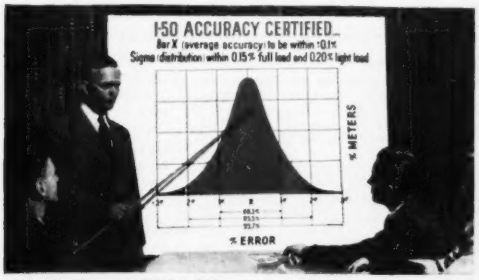
CERTIFICATE SHIPPED in each box is your assurance that I-50 meters are factory certified within prescribed limits.

General Electric factory certifies I-50 meters for both accuracy and performance

Only watthour meters accurate as I-50's can be factory certified within these narrow limits: Bar X (average accuracy) within ±0.1% and Sigma (accuracy distribution) within 0.15% on full-load and 0.20% on light load. Also, 99.9% free from defects that might cause improper registration or operation.

Certification of the I-50 is made possible only because of radical new design features, improved manufacturing techniques, and exacting quality control procedures.

You know that all types of meters are *not* alike—in either accuracy or performance. Why not evaluate and compare your own groups of meters? For complete information, call your G-E representative or write for descriptive bulletin GED-1408; Section 601-76, General Electric, Schenectady 5, N. Y.


I-50 ACCURACY CERTIFIED...
Bar X (average accuracy) to be within ±0.1%
Sigma (distribution) within 0.15% full load and 0.20% light load
% METERS
% ERROR

CERTIFIED ACCURACY is based on standard method of group evaluation that reduces calibration data to two figures: Bar X (average accuracy) and Sigma (accuracy distribution).

CERTIFIED PERFORMANCE means all meters pass 18 electrical tests, including final tests shown above, and 356 points of inspection. Factory then certifies I-50 meters to be 99.9% free from defects.

GENERAL ELECTRIC

601-76

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

MAY 1951

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-third year of publication

VOL. 106
NO. 5

ELECTRICAL WEST

George C. Tenney, Editor
W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor — John Coots, Typography

Convention-In-Print

This year's theme for Electrical West's "Convention-In-Print" will be "Mobilization for Defense." As is our custom for this imaginative coastwise convention, leaders representing various branches of the industry are invited to participate in the "program." This year there will be a series of pieces outlining what each branch of the industry is planning and doing to contribute to the defense mobilization program. A complete analysis of the power production capabilities of the West, now as compared with 1941, will be given.

Problems of the manufacturer, contractor, wholesaler, and other branches of the industry under the defense program, will be treated. Problems of utility financing under existing conditions will be an innovation on our "program."

There will be a special piece dealing with the important subject of civil defense by a man who is handling the work of organizing and planning on a full-time basis for one of the utilities. Another contribution will be on the subject of distribution planning by a prominent utility executive.

Presidents of the three industry associations of the West will present their usual annual messages treating of the particular problems of their respective regions.

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High lines continue to open the market for wiring supplies and appliances. Enterprising Socorro, N. Mex., dealer-contractor, Leslies Hicks, follows Socorro REA construction crew with his wiring truck, while his truckload of G-E appliances tags along. He sold $124,000 worth of appliances this way in 1950. For details, see article in future issue of "Electrical Merchandising."

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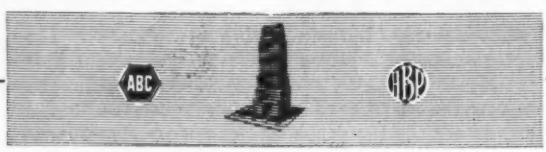

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You said it...

...We did it!

We designed ELEMEX capacitors to give you what you need!

Utility men with ten to fifteen years of field experience knew pretty well what they needed and wanted in capacitors. Just about ten years ago L-M began its capacitor design and in 1944 began producing capacitors incorporating some of these user-ideas.

ELEMEX capacitors have an excellent service record. Rate of failure has been low; performance has been consistently good—so good, in fact, that we have never completely caught up with the demand for more and more ELEMEX capacitors.

Here are some of the things you said you wanted in a capacitor, and what L-M has done about it.

1. Long life: L-M's low unit insulation stress, individual evacuation, capillary impregnation and many in-process tests have assured a very long life and freedom from trouble. We're proud of our performance record! Over 99.44% of all ELEMEX capacitors manufactured over a 7-year period are still in operation. That is a failure rate of less than 1/10% per year!

2. Strong solder-sealed bushings: L-M developed a new, stronger method of solder-sealing. L-M tests 100% of its bushings and seals. Actually, it takes 1900 pounds to force an L-M bushing out of the cover! Also we've got higher creepage distance, unbreakable terminal caps.

3. Pure aluminum electrodes: Not just tinned copper—but pure aluminum.

4. Simple, easy installation: We designed them with uniform terminal height above mounting flanges, gave you "Paragroove" connectors which simplify wiring.

5. Low-cost maintenance: L-M introduced stainless steel tanks and will *continue* to produce them as long as Type 304 is available. (Incidentally, this forced down the price of mild steel units, which saved you money on *both* types!) L-M mild steel tanks have *three* coats of enamel, each *baked* separately, not just one or two spray coats.

6. Streamlined tanks: Large-radius rounded corners make ELEMEX tanks smooth, give improved appearance, and extend paint life. Sharply sheared edges always corrode first.

7. Convenient, sensible packaging: In sturdy, wood reinforced sealed cartons. Full identification printed on sides and ends of carton, with the serial number repeated on the top of the carton for the convenience of the storekeeper. Painted surfaces subject to abrasion in shipment are protected with wax paper. Only L-M packs its 2 and 4 unit hangers in individual cartons to simplify handling for you.

8. Simple low-cost switching: L-M's new Voltage-Sensitive Control gives you accurate, dependable switching at a cost low enough to permit its use even with small capacitor banks.

Want to cut line losses? Reduce wattless current on your lines? Get capacitors that stay on the job? Ask the L-M Field Engineer for full information on ELEMEX capacitors; or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).

LINE MATERIAL... Capacitors

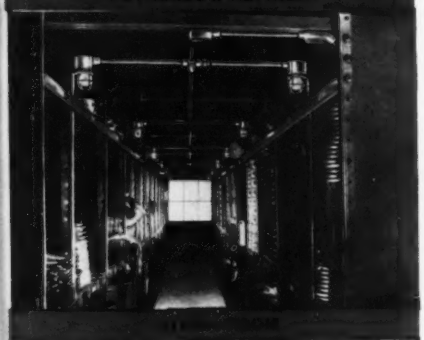
Complete Coordinated Equipment for Distribution Today

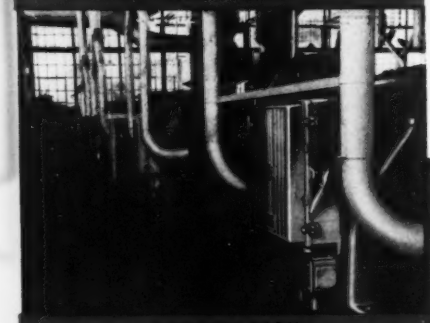
CONDULETS* and rigid conduit

YOU can install galvanized CONDULETS and galvanized rigid conduit under all atmospheric conditions and in all occupancies

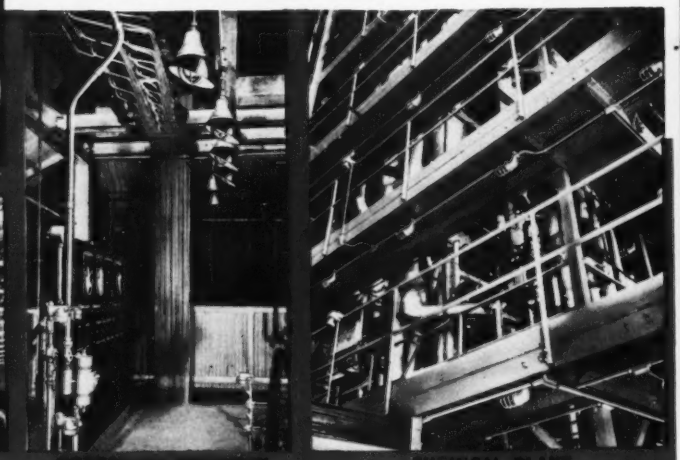
(*See Article 346, Section 3462, National Electrical Code.*)

PETROLEUM REFINERY





GRINDING ROOM



The **CONDULET** and rigid conduit method meets the requirements of the National Electrical Code in locations exposed to weather, heat, moisture, steam, vapor, dust and dirt or locations that are hazardous because of the possibility of the presence of flammable gases or vapors, or combustible dusts. The same sterling qualities that make **CONDULETS** the first choice in these special applications, make them first choice in ALL ordinary locations.

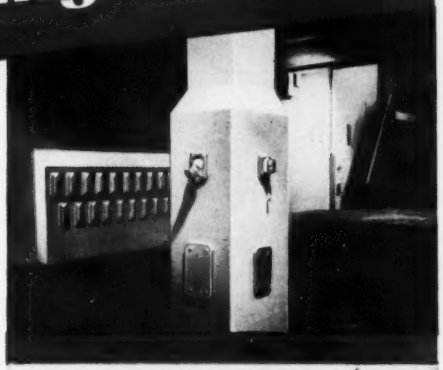
**CONDULET* is a coined word registered in the U. S. Patent Office. It designates a product made only by the Crouse-Hinds Company.*

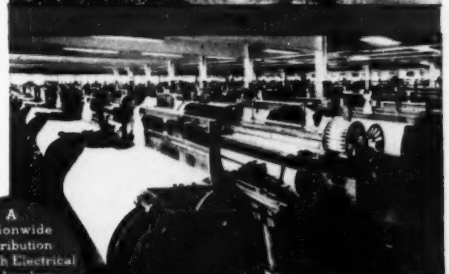
....the UNIVERSAL wiring method

"for MODERN WIRING . . .

the CONDULET and conduit method

gives you definite advantages"





1 MECHANICAL PROTECTION . . . Rigid conduit and cast Feraloy CONDULETS provide the best possible protection against accidental damage to the wiring and equipment. Prevents costly shutdowns.

2 SAFETY . . . A CONDULET installation gives maximum protection against personal injury and fire. The continuous conduit system made up with taper threaded CONDULETS provides a reliable and permanent low resistance path to ground.

3 FLEXIBILITY . . . To meet all the diverse requirements of modern electrical layouts, CONDULETS are made in a wide variety of shapes and sizes with varied hub arrangements, including a full line of CONDULETS with detachable hub plates.

4 ECONOMY . . . The installed cost compares favorably with other methods, while the total cost over the years is definitely lower, due to the durability, reliability, safety, and low maintenance cost of a CONDULET and rigid conduit system.

5 CORROSION RESISTING . . . Galvanized cast Feraloy CONDULETS offer the best protection wherever moisture, dust or corrosive atmospheres are present.

6 QUALITY . . . The trademark CONDULET stands for reliability and long life. Every CONDULET is built to Crouse-Hinds high standard of quality with painstaking care by skilled craftsmen.

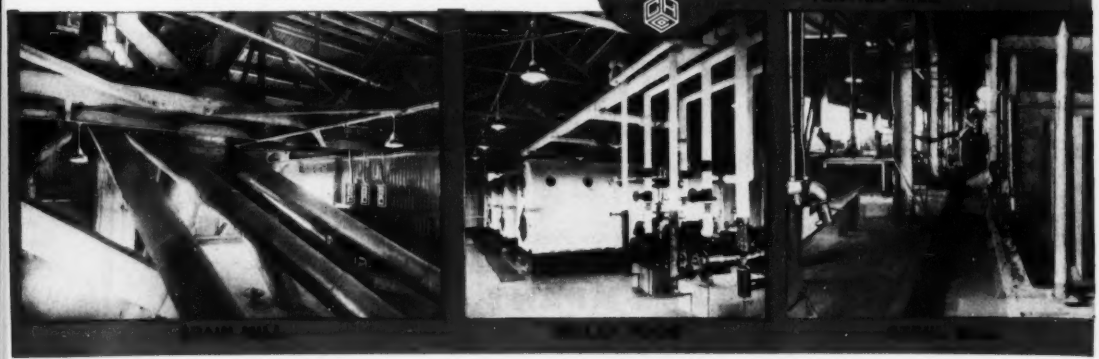
On **YOUR** next electrical layout, for any location, plan to get all the benefits of sturdy cast Feraloy CONDULETS and rigid conduit . . . the UNIVERSAL wiring method. More than 15000 types and sizes are listed in the CONDULET Catalog.

CROUSE-HINDS COMPANY

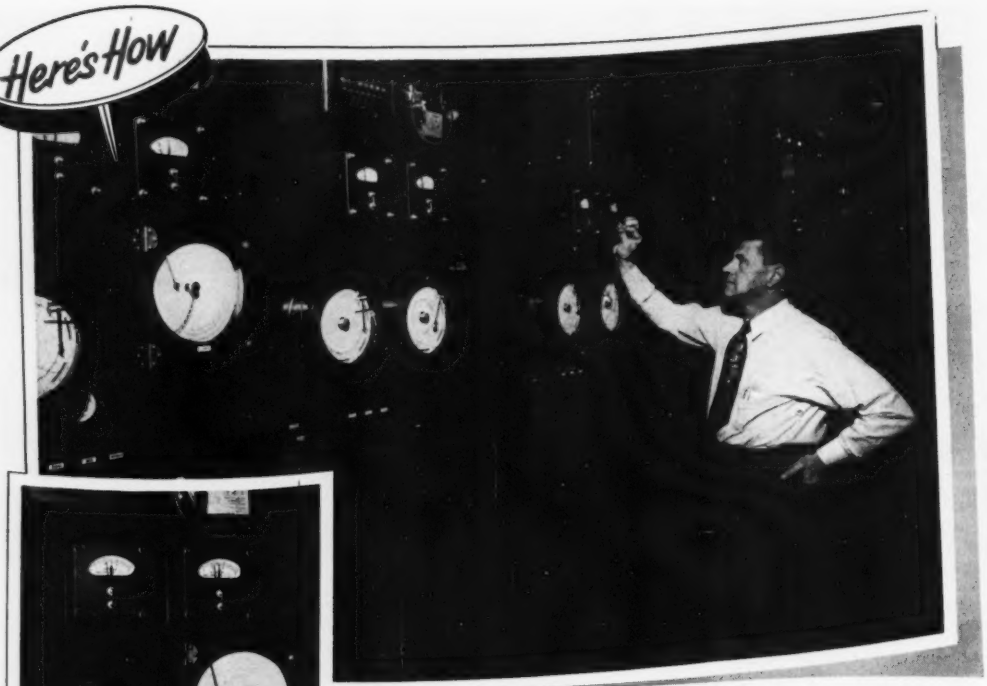
Syracuse 1, N. Y.

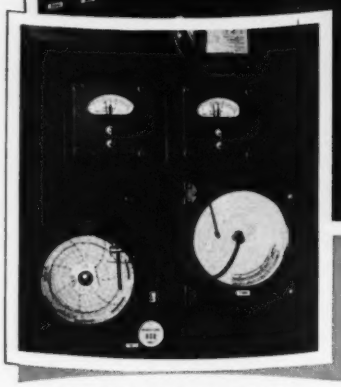
Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee — Minneapolis — New York Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Washington. *Resident Representatives:* Albany — Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va. CROUSE-HINDS COMPANY OF CANADA, LTD., TORONTO, ONT.

A Nationwide Distribution Through Electrical Wholesalers



Here's How

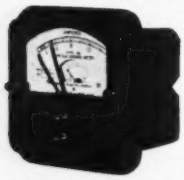




Photos: Courtesy of Detroit Edison Company, Detroit, Mich.

You can get the maximum out of your existing Distribution Equipment

LINCOLN TYPE AD-2
Ampere Demand Meters



LINCOLN TYPE CCA
Graphic Demand Meters

To load your distribution system to the ultimate safe limit, you *must* know the load on your feeders. Lincoln Ampere Demand Meters give you the facts you need—on the basis of *continuous* information—to keep the loads between feeders balanced.

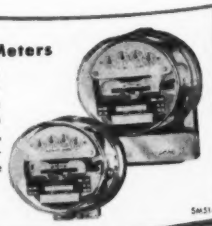
Type AD-2 Thermal Ampere Demand Meters show the demand on the feeder phases at all times as well as the maximum demand reached since the last manual resetting.

Type CCA Graphic Ampere Demand Meters provide an accurate and reliable means of ascertaining this information wherever a record of the time and duration, as well as the magnitude, of the demand is required.

Bulletins 450, 461 and 467 tell the whole story—write for your copies.

Sangamo J Meters

These watthour meters meet today's requirements and tomorrow's anticipated loads with sustained accuracy, economy of maintenance and troublefree performance.

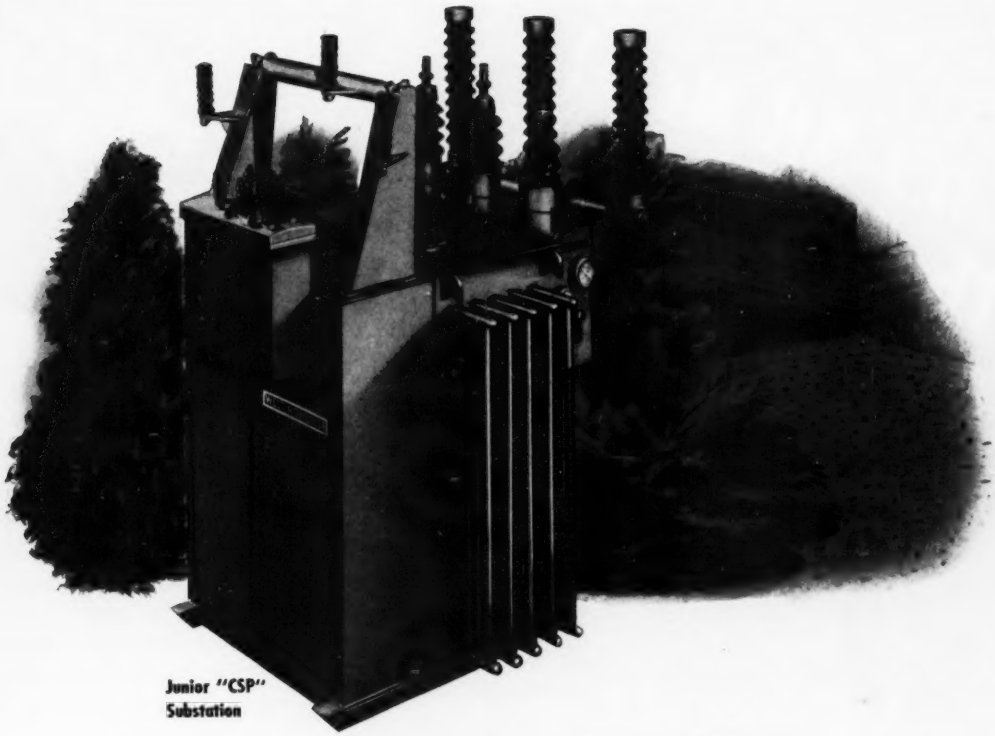


SJm51-4

SANGAMO — *Only Measured Facts are Known Facts*

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS



Junior "CSP" Substation

A complete unit substation

—FOR SMALL CAPACITIES, too!

Here's a unit substation that answers small capacity needs. It's the Westinghouse Junior "CSP", a single-feeder substation that provides fast installation . . . greater flexibility . . . simplified maintenance . . . *at a much lower cost.* This new design is based on the principles proved in hundreds of larger rated "CSP" substations.

The Junior "CSP" (Completely Self-Protecting) Substation is completely factory-assembled, with integral high and low-voltage switchgear, and metering equipment. Thermal and lightning protection are both built in. It's ideal for rural lines, small towns and borderline areas where a larger rated substation is not justified.

Available in ratings from 300 to 1,000 kva . . . others to 3,000 kva. For further details contact your nearest Westinghouse representative, or write for Booklet B-4692, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70583

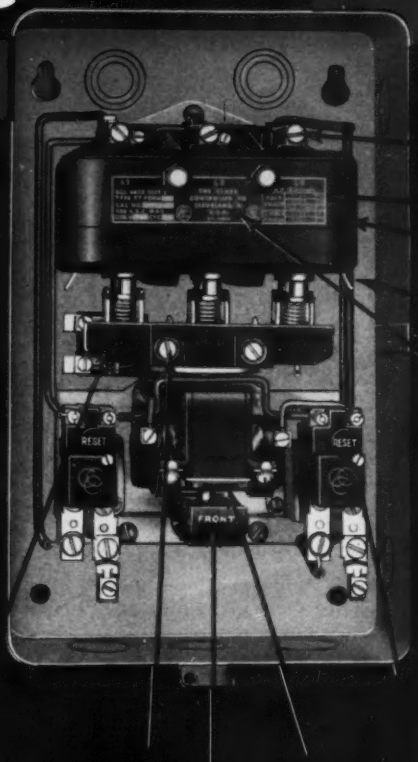
YOU CAN BE SURE... IF IT'S Westinghouse

JUNIOR "CSP" POWER TRANSFORMER

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

It's All New! The CLARK "CY" AC Motor Starter

The Starter



PRESSURE TYPE TERMINALS LINE AND LOAD

ONE PIECE UPPER ARC SHELL PROTECTS TERMINALS FROM HOT GASES

ARC SHIELDS INORGANIC NON CARBONIZING MATERIAL

FINGER CLIPS FOR EASY CONTACT INSPECTION

MAGNETIC ARC INTERRUPTERS WITH ARC CHAMBERS

AND MOVE

VERTICAL LIFT MAGNET WITH STEEL GUIDE USES NO SPRINGS

another CLARK FIRST!

Here, for the first time is a rugged AC magnetic starter that provides the extra protection and dependable operation of "Mill-Type" heavy-duty construction and design at *no premium above ordinary starter prices!*

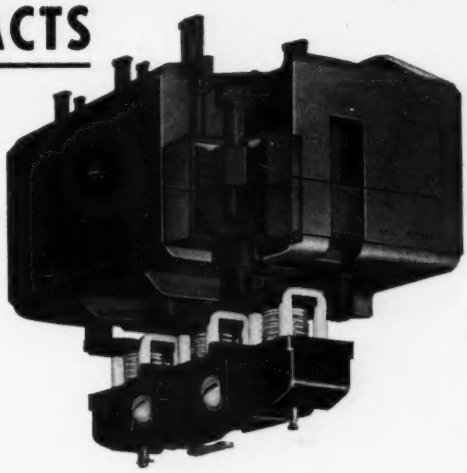
Let a CLARK application engineer show you what this BLUE RIBBON PRODUCT means to you in increased production and lower maintenance.

CLARK ENGINEERED ELECTRICAL CONTROL

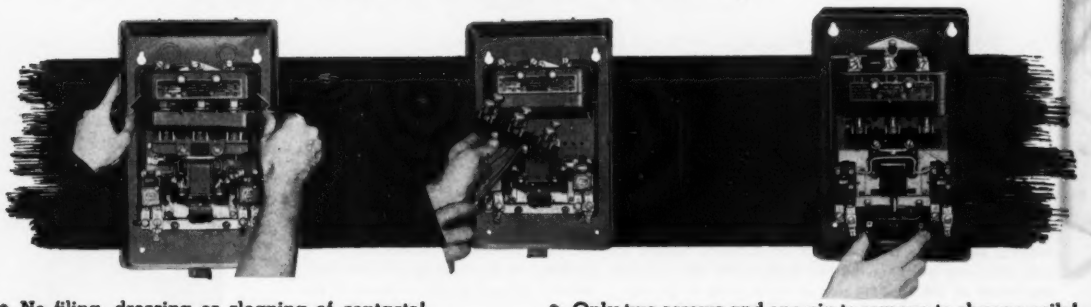
with the sensational NEW multi-turn magnetic blowouts

and TWIN-BREAK CONTACTS

The "CY" starter employs an entirely new principle of arc interruption. The arc is extinguished by the effect of the blow-out coil, *concentric with the contact.* The magnetic field quenches the arc either by lengthening or confining it. In its *forced rotation* it moves continually from a hot to a cold spot —preventing burning or pitting of contacts. The ingenious design of the arc chamber prevents carbonization and the accumulation of ionized gases between wiring terminals —minimizing phase-to-phase failures.*



The Maintenance Man's Dream!



- No filing, dressing or cleaning of contacts!
- No tools necessary to inspect contacts!
- Easy to change moving contacts!
- Stationary contacts changed quickly with screw driver!
- Only two screws and one pin to remove to change coils!
- Only four screws to remove to take out stationary magnet frame!
- Power circuit contacts available with springs in complete packaged service kits for ease in stocking!

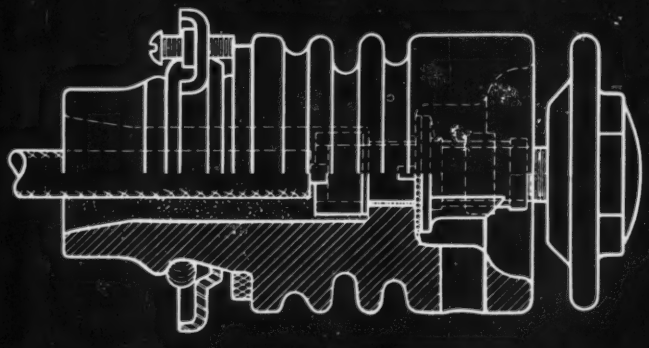
**Magnetic blow-out coils are used on all size 2 and 3 "CY" starters. Sizes 0 and 1 use the same general Mill-Type construction as the larger sizes.*

THE CLARK CONTROLLER CO.

1142 EAST 152ND STREET · CLEVELAND 10, OHIO

IT'S A FACT:

KUHLMAN QUICK-GRIP . . . MOST COPIED TRANSFORMER BUSHING . . . BECAUSE IT'S SAFER!



We're proud of the fact that the Kuhlman Quick-Grip bushing terminal, because of its outstanding safety and convenience, has become the most copied transformer bushing in America! Not only have its features been adopted by other transformer manufacturers, but it has also been specified as the preferred design by utility engineers.

Why? Because the heavy insulating knob by which connections are made prevents a lineman from making accidental contact with live parts. And, because the wire is connected to the terminal through the side, he does not have to grip over the lead as is the case where the wire enters a rotating chuck type terminal. Still an exclusive feature with Kuhlman Quick-Grip bushings: there is only one entry point for the line lead, which eliminates the possibility of the sharp point of the lead protruding on the opposite side of the bushing to provide a definite hazard to the lineman or his clothing.

Kuhlman Quick-Grips are easy to operate, too, since no tools are needed in making the line connection. The clamp accommodates the full range of wire sizes prescribed by EEI-NEMA Standards. All mounting hardware is inside the tank, protected from the corrosive effect of the atmosphere.

The Kuhlman Quick-Grip bushing is available on all Kuhlman transformers 5 KV and below where sidewall high voltage bushings are standard construction. Write today for full details.

Kuhlman ELECTRIC COMPANY, BAY CITY, MICHIGAN

EXPORT REPRESENTATIVES: International Standard Electric Corporation, 67 Broad Street, New York 4, N. Y. Cable Address, Marconiphone, N. Y.

A complete transformer line for ALL your needs. Write for new Kuhlman bulletins on Distribution, Power, Dry Type, Street Lighting and Specialty units.

KUHLMAN ELECTRIC K E

THIS WAY...

Unlike the housewife who uses bread crumbs and other materials to "stretch" the available supply of hamburger, Simplex is not able to add materials to copper to make it go further. We do achieve the same result, but by an entirely different means. Our way is to insulate the copper with Simplex-Anhydrex XX high voltage insulation. It is the very best "copper extender" that we know.

Simplex-Anhydrex XX is a product of Simplex research and development. It is an insulation that is absolutely "tops" in the high voltage field. It is designed to operate at a maximum of 167° to 176°F. (75° to 80°C.) copper temperature, depending on operating conditions. It has all the properties you want in such a high voltage rubber insulation. It will withstand heat. It also withstands ozone and aging, and it is guaranteed not to absorb more than 15 milligrams of water per square inch of exposed surface when tested in accordance with U. S. Coast Guard standards.

So far as we know it is the only insulation of its kind. Use it wherever you have a high voltage problem, whether the cables are to be installed directly in the earth, underground in ducts, under water, or overhead supported from messenger wire.

You can help to "s-t-r-e-t-c-h" the small available supply of copper by insisting that your high voltage cables be insulated with Simplex-Anhydrex XX insulation. Do you want to know more about this unique insulation? Then fill in the coupon below.

SIMPLEX-ANHYDREX XX

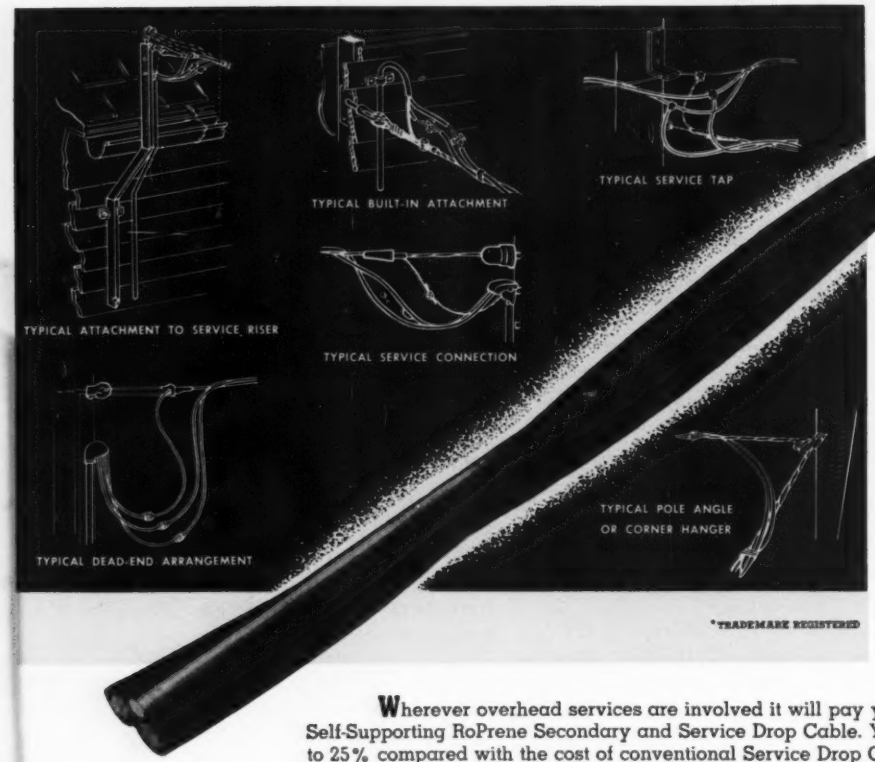
SIMPLEX WIRE & CABLE CO.
79 Sidney St., Cambridge 39, Mass.

SIMPLEX WIRE & CABLE CO.
79 SIDNEY ST., CAMBRIDGE 39, MASS.
GENTLEMEN: PLEASE SEND A COPY OF BOOKLET 1009A TO:

NAME_____ TITLE_____
COMPANY_____
STREET_____
CITY_____ STATE_____

SAVE UP TO 25%...

with Rome Self-Supporting RoPrene Secondary and Service Drop Cable



Rated at 600 volts with maximum continuous copper temperature of 80° C.

*TRADEMARK REGISTERED

Wherever overhead services are involved it will pay you to use Rome Self-Supporting RoPrene Secondary and Service Drop Cable. You can save up to 25% compared with the cost of conventional Service Drop Cable (Type SD). Construction is better and it lasts longer. There are no coverings to rot and festoon. It has remarkable weather resistance. It possesses excellent physical and electrical characteristics.

Installation and maintenance costs are also less than the cost of open weatherproof wire. Less labor and cheaper hardware can be used. When used as secondaries, Rome Self-Supporting RoPrene Cable is more compact, eliminates unsightly multiple wire construction, jointly occupied poles and long spans. On larger sizes, there is also a substantial saving in copper losses due to the lower reactance of a self-supporting cable compared with open wires.

NEW DATA AVAILABLE!—BULLETIN RS-4, just published contains specification and test details, as well as sag and tension data on Rome Self-Supporting RoPrene Cable. It's yours for the asking. Sign and mail the coupon below or write.

IT COSTS LESS TO BUY THE BEST...BUY ROME CABLE

ROME CABLE CORPORATION, Dept. EW-5 Rome, N. Y.
Please send me Bulletin RS-4

Name ..... Title .....

Company .....

Street .....

City ..... Zone ..... State .....

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE ROME, N.Y.

WESTERN SALES OFFICES AND WAREHOUSES

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230 South 4th West St.

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SEATTLE 4, WASH.
3404 Fourth Ave., So.

DENVER 3, COLO.
1160 Elati St.

High Insulation Strength

NEW ALLIS-CHALMERS
POTENTIAL TRANSFORMERS

★ **Corona-Free Design**
★ **High Thermal Capacity**
★ **Hermetically Sealed Tank**

Type SPW transformers for line-to-line or line-to-ground operations are available in all standard ratings. The transformers shown have standard insulation class ratings of 69 kv.

FOR HEAVY DUTY and accurate metering, the new Type SPW outdoor potential transformer will perform to your highest expectations. Severe insulation tests prove the SPW has excellent impulse characteristics and high 60 cycle dielectric strength. Yet it is light weight, small and compact as the table below shows.

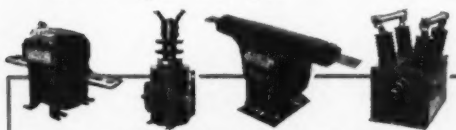
Corona-free design, applied to the vacuum dried insulation, protects the coil—another step toward longer transformer life. The tank is all-welded and hermetically sealed to protect insulation and oil from sludge formation. The unique SPW bushing construction—with oil common to both the bushing and transformer tank—has reduced transformer size and oil requirements.

Contact your nearby A-C district office for details on any of the wide range of Allis-Chalmers instrument or metering transformers. Or write Allis-Chalmers, Milwaukee 1, Wisconsin for bulletin 61B7168 listing over 400 types and ratings.

A-3271

DATA FOR TWO BUSHING TRANSFORMER

Rating	Impulse Strength kv	Output at 55°C Rise	Base Dimension	Height	Net Weight
SPW-2 24 kv	150	3½ kva	14½ x 14⅝	36½	252
SPW-3 34.5 kv	200	4 kva	15½ x 16⅝	39	310
SPW-4 46 kv	250	4 kva	19 x 19	49	615
SPW-6 69 kv	350	6 kva	25½ x 24	61	1050



OVER 400 TYPES AND RATINGS

INDOOR CURRENT transformer for low voltage metering. Type KLW 600 v.

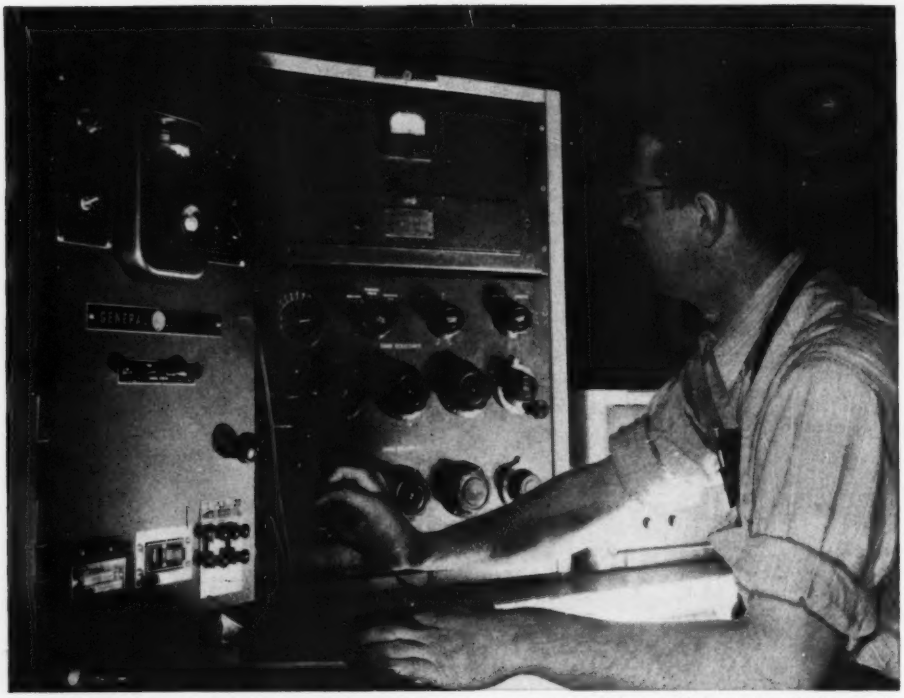
OUTDOOR CURRENT transformer. For heavy duty metering. Type KO to 15 kv.

INDOOR CURRENT transformer. For heavy duty metering. Type K3E to 15 kv.

INDOOR POTENTIAL transformer. Type PD, fused or unfused, 200 va up to 14,400 volts.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS



All control elements are individually pre-tested before assembly. Here a composite test of the assembled control panel is being made. A final check of the operation of the completely assembled regulator assures proper co-ordination of all components.

NOW—CLASS 1 ACCURACY

ASA Standard C57.15-1949 defines three classes of accuracy for control:

Class 1: not over ± 1% over-all error (99% accurate)

Class 2: not over ± 2% over-all error

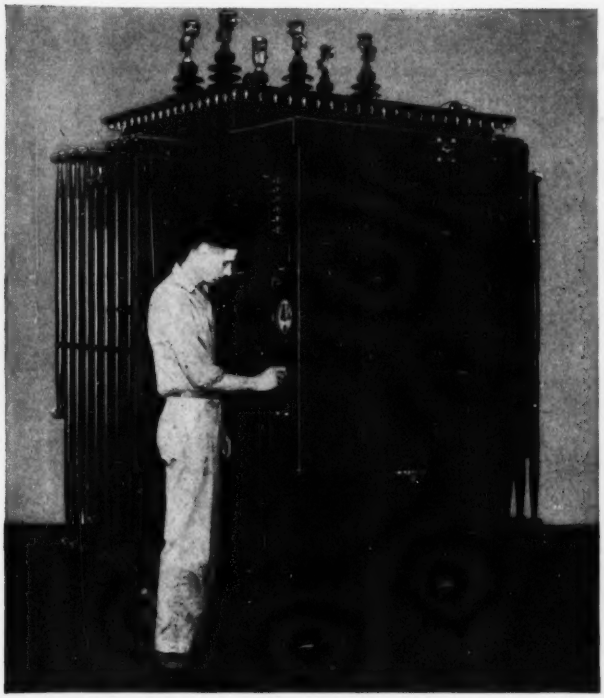
Class 5: not over ± 5% over-all error

This Standard recognizes errors arising from changes in temperature, frequency, ratio, regulator position, and load and their combined effects on the accuracy of:

1. Potential supply
2. Voltage regulating relay and associated ballast
3. Current transformers
4. Line drop compensator resistance and reactance elements.

The maximum plus error and the maximum minus error must be determined in accordance with ASA Test Code C57.25. The largest total error, *either plus* or *minus*, determines the accuracy class of the regulator control.

The assembly of the voltage regulating relay, the "brain" of the regulator, requires skilled craftsmanship.



General Electric's three-phase 32-step Type MLT regulators are available in standard ratings for circuits up to 25,000 kva and 69,000 volts.

General Electric's Type IRS induction voltage regulators provide the finest regulation obtainable for heavily loaded, urban feeders.

IN G-E REGULATORS —AT NO EXTRA COST

This means better utilization of your feeders because they can now carry heavier loads for greater distances.

With ASA Class 1 accuracy controls on your regulators, more drop can be allowed in a regulated feeder without *at any time* exceeding established voltage limits.

These highly accurate controls meet ASA Standards for Class I devices, which call for at least 99% accuracy regardless of operating changes in temperature, frequency or load. And—they're now *standard equipment* on all General Electric station-type feeder voltage regulators. This includes induction-types IRS and IRT, as well as the step-type MLT 32.

This important new development stems from several years of research and engineering. Laboratory techniques have been adapted to factory procedures. The production of these controls demands the same brand of "know-how" that has made General Electric the leader in the field of voltage regulation for over fifty years.

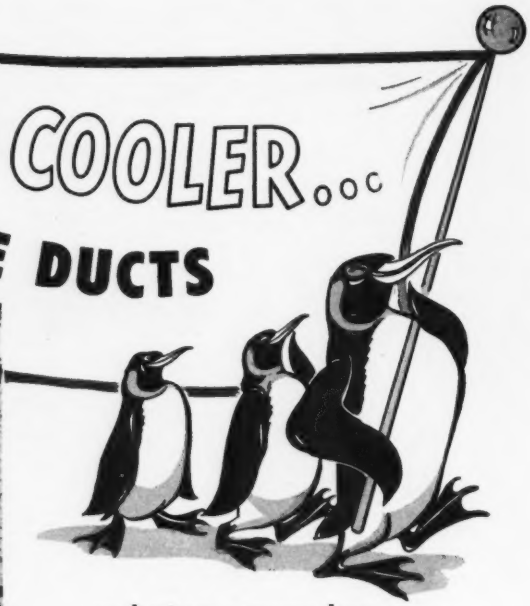
For further information on how Class 1 accuracy can increase feeder capacity for you, see your G-E representative. *General Electric Co., Schenectady, N. Y.*

404-75

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Cables run COOLER... in TRANSITE DUCTS



... reducing copper losses
... increasing current capacity
... prolonging insulation life

YOU REDUCE copper losses ... increase current carrying capacity ... and prolong insulation life, when you run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or I^2R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed. In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 290, New York 16, N. Y.

*Reg. U. S. Pat. Off.

How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV (6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daily Load Factor—75%
Earth Temp. ambient—20 C

	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric loss (C)	1.9	2.1
Allowable Rise for Copper loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current—(Amps. per cdr.)	386.	365.
Allowable Current—(Relative %)	105.6	100.

Johns-Manville *Transite Ducts*

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

for
Smooth Starting
of Squirrel Cage Motors—

use one of these 6 Reduced Voltage Starters

To prevent damage to many machines or to materials in process, squirrel cage motors often need gradual acceleration. For such applications, one of these reduced voltage starters will provide the desired speed-torque control.

This line of A-B starters is extremely versatile, providing either manual or automatic starting . . . with 2 or 3 step acceleration . . . or stepless control up to full speed . . . to fit the most critical motor starting requirement.

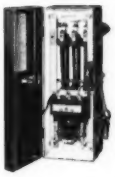
MANUAL—TRANSFORMER TYPE

Manual transformer type starter up to 125 hp, 220 v; 250 hp, 600 v max. Air break or oil immersed contacts. Automatic reset overload relays. Time delay mechanism determines proper time interval for manual switchover of hand lever.

BULLETIN 646

MANUAL—COMPRESSION TYPE

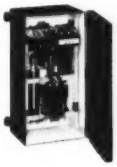
Manual compression resistance starter up to 50 hp, 220-600 v max. Graphite discs in the insulated tubes are compressed with the hand lever for stepless speed control. Ideal starters for chain or belt drives. Overload relay protection.



BULLETIN 640

AUTOMATIC—3 STEP RESISTANCE

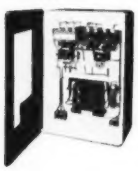
Automatic resistance starter up to 400 hp, 220-600 v max. Accelerates squirrel cage motors in 3 steps. Resistors easily adjusted for ideal starting of motors on power networks. For more than 3-point control, use Bulletin 742 starter, below.



BULLETIN 741

AUTOMATIC—TRANSFORMER TYPE

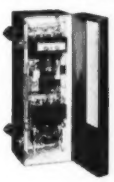
Automatic reduced voltage starter up to 300 hp, 600 v max. An accurate timing relay controls the accelerating time. Operator touches start button—the starter does the rest. Available in standard, watertight, and dusttight enclosures.



BULLETIN 746

AUTOMATIC—2 STEP COMPRESSION

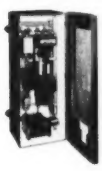
Automatic resistance starter with preset adjustable graphite resistors up to 250 hp, 220-600 v max. Push button closes starting circuit through resistors. Later, timing relay closes running contactor and cuts out the starting resistors.



BULLETIN 740

AUTOMATIC—STEPLESS TYPE

Fully automatic resistance starter with solenoid controlled graphite disc resistors rated up to 500 hp, 220-600 v max. Stepless control of current and speed. Acceleration adjustable to avoid lamp flicker. Overload relay protection.



BULLETIN 742

Write for Bulletins to Allen-Bradley Co., 1316 South Second Street, Milwaukee 4, Wisconsin

A-B Quality

ALLEN-BRADLEY

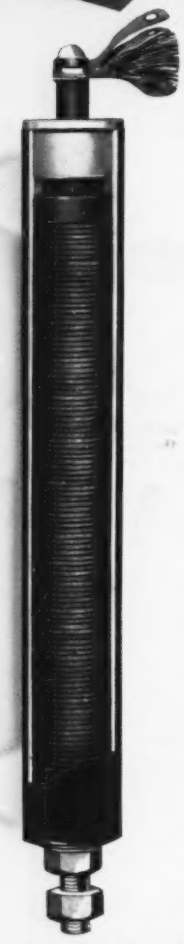
REDUCED VOLTAGE STARTERS

QUALITY

351-MR

for VELVET SMOOTH ACCELERATION

use these Allen-Bradley Starters with Graphite Compression Resistors



Cutaway view of Allen-Bradley graphite resistor tube showing discs, insulating lining, and the pressure terminal.

With these Allen-Bradley compression resistance starters you can start squirrel cage motors with such velvet smoothness that there is no voltage dip . . . no lamp flicker. The secret of this stepless acceleration lies in the smooth control of the Allen-Bradley graphite compression resistors which are shown below.

BULLETIN 640 MANUAL
Stepless Resistance Starter

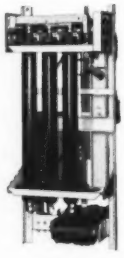
The motor current passes through the graphite disc resistors. Compressing them with the hand lever reduces the starting resistance steplessly until it is shunted automatically by the running contactor.

Bulletin 640 manual starters have a hand lever for manually compressing the resistors. At maximum speed position, a magnetic contactor automatically connects the motor to full voltage.

BULLETINS 740 & 741 AUTOMATIC
2 and 3 Step Resistance Starters

In these two resistance starters the adjustable resistors are arranged in 2 or 3 steps. Each step is cut out, successively, by timing relays. These starters can be easily adjusted for equal current inrush per step.

Bulletin 740-741 starters are rugged, automatic starters.



BULLETIN 742 AUTOMATIC
Stepless Resistance Starter

In this starter, compression of the graphite discs is done automatically by a solenoid mechanism. Absolutely velvet smooth acceleration is obtained. No other starters provide similar stepless control.

Bulletin 742 resistance starters prevent lamp flicker on network systems. They provide automatic stepless starting for machines and processes which are easily damaged by sudden starting.

BULLETIN 646 TRANSFORMER TYPE STARTER

For loads with high starting friction, requiring sudden applications of power, use the Bulletin 646 manual or the Bulletin 746 automatic transformer type starters.

Write for Bulletins to Allen-Bradley Co., 1316 South Second Street, Milwaukee 4, Wisconsin

ALLEN-BRADLEY
REDUCED VOLTAGE STARTERS
QUALITY

A-B Quality

351-MR

You can't buy Better Fittings or ones that cost less to use

Cross Section Showing Indentations.

Quicker to use and neater in appearance, Briegel All-Steel Indenter Fittings not only make stronger connections but also make each job more profitable to the contractor and satisfactory to his customers.

Two Easy Squeezes and they're set to stay. It is only natural that the Briegel All-Steel Indenter Fittings are the most widely used E.M.T. connectors and couplings. Contractors the world over recognize their cost cutting qualities and the fact that they make each wiring job neater, stronger and better.

All B-M Fittings Carry the Underwriters Seal of Approval

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

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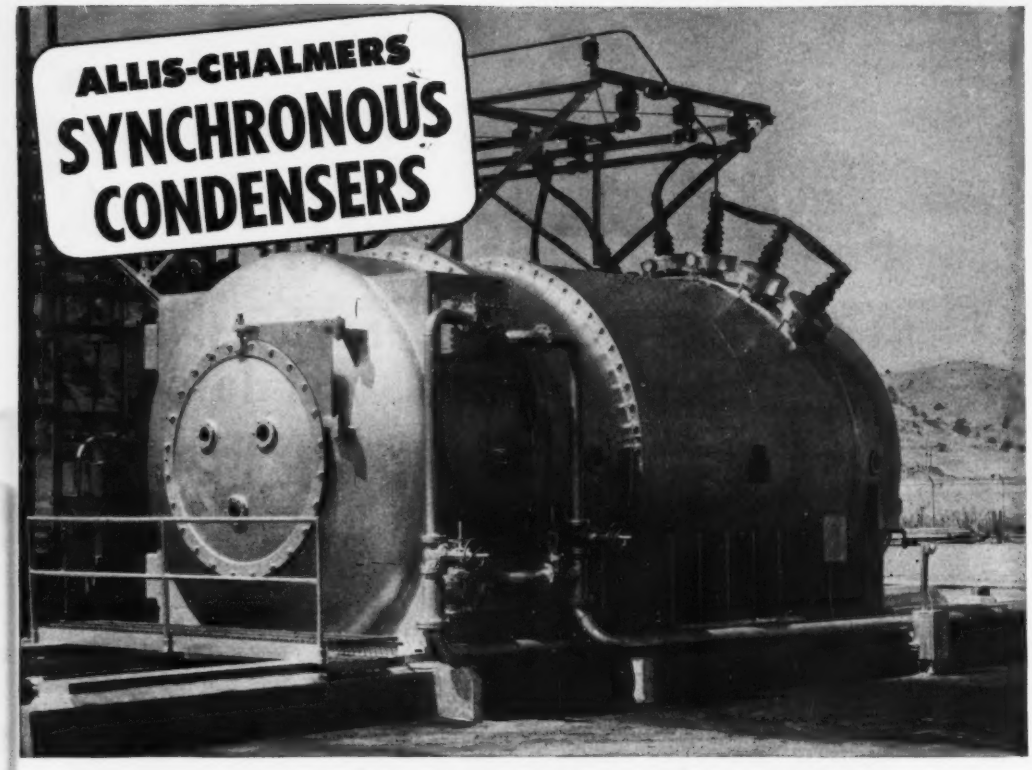
The M. B. Austin Co., Northbrook, Ill.; Clayton Mark & Co., Evanston, Ill.; Wagner Malleable Products Co., Decatur, Ill.; Clifton Conduit Co., Jersey City, N. J.; General Electric Co., Bridgeport, Conn.; The Steelduct Co., Youngstown, Ohio; Enameled Metals, Pittsburgh, Penn.; Kondu Mfg. Co. Ltd., Preston, Ont.



Southern California Edison Stabilizes Transmission System

With Allis-Chalmers Hydrogen-Cooled Synchronous Condenser

THIS 40,000/16,800 KVA HYDROGEN-COOLED SYNCHRONOUS CONDENSER supplies reactive kva to regulate voltage and stabilize the far-flung transmission lines of Southern California Edison. It is one of several similar Allis-Chalmers machines built and building for large power systems with relatively long transmission lines. All are custom built to fill system requirements and incorporate proven Allis-Chalmers features which assure long service life and low operating cost.

Whatever problem you may have in electrical power generation, distribution, control or regulation, your Allis-Chalmers representative can help you. For further information on Allis-Chalmers synchronous condensers, write Allis-Chalmers, Milwaukee 1, Wis., and ask for Bulletin 05B7285. A-3345

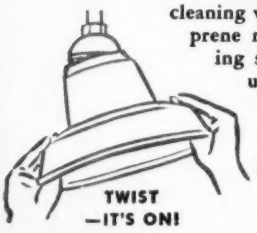
ALLIS-CHALMERS

NEW APPLETON V-51 SERIES

CONVERTIBLE VAPORTIGHT LIGHTING FIXTURES

WITH MALLEABLE IRON BODIES
100 WATT OR 150-200 WATT UNITS

EXCLUSIVE UNIT ASSEMBLY!



TWIST —IT'S ON!

Never before a vaportight lighting fixture so safe, so efficient, so easy to install . . . so economically serviced and maintained!

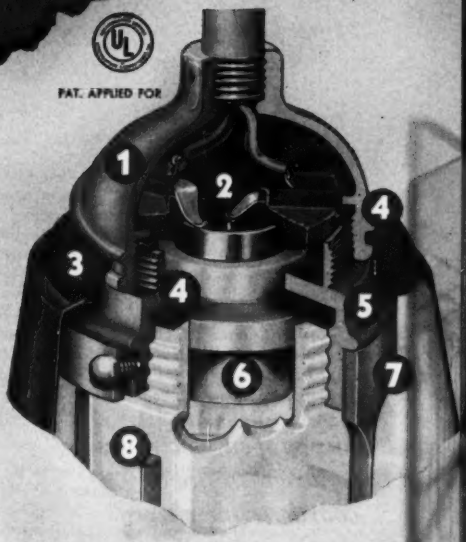
Combined in an exclusive "Unit Assembly," receptacle, globe and guard are detachable as a *single unit* instantly, without tools! Re-lamping or cleaning becomes safe, swift and simple. One trip up the ladder to exchange assemblies, and the job's done!

This outstanding new V-51 line includes 18 different types of rugged malleable iron bodies for pendant, ceiling or bracket mounting. Each body takes both 100 Watt or 150-200 Watt "Unit Assemblies." Each body, except bracket types, is grooved to mount four reflector styles in three different sizes. This *complete interchangeability of parts* permits the assembling of 256 complete fixtures, using only 32 basic components.

Reflector is quickly attached or removed for cleaning without tools—thanks to exclusive neoprene rubber ring attachment. Shock-absorbing socket in "Unit Assembly" permits the use of standard lamps where costlier mill-type lamps were formerly used.

For full details on this great new fixture, write for Bulletin 5-A.

PAT. APPLIED FOR



NEW—INSIDE AND OUT

Sectional View Shows Outstanding New Design and Operating Principles.

1. Malleable iron fixture body.
2. Connecting block with spring leaf contacts.
3. Neoprene rubber ring holds reflector.
4. Vaportight gaskets.
5. Globe and guard adapter body.
6. Shock-absorbing socket.
7. Snap-on type guard.
8. Vaportight globe.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1709 Wellington Avenue • Chicago 13, Illinois

LOS ANGELES 12, 100 N. Santa Fe Avenue
SEATTLE 9, 115 Ray Street
SAN FRANCISCO 1, 655 Minna Street
DENVER 2, 1921 Blake Street

MALLEABLE IRON CONDUIT FITTINGS

APPLETON ELECTRIC PRODUCTS

Life Insurance
for line-type arresters

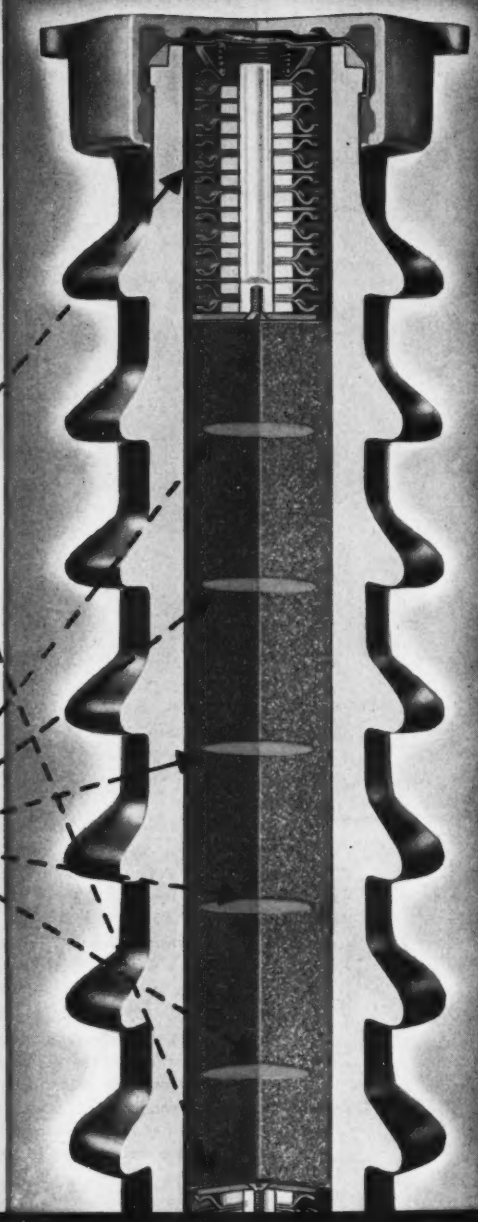
WE'VE MADE THEM LAST LONGER
WITH THESE L-M FEATURES

Capacitance type spark gap maintains consistently low sparkover

Accurately shaped heavy alloy disc electrodes help assure uniform sparkover. These discs are separated by special ceramic spacers with silvered faces. These form a simple, effective voltage divider of the capacitance type which maintains uniform voltage distribution in the gap and protects it from stray electrical fields and the effect of snow or water on the housing. The ceramic spacers have a dielectric constant about 400 times that of the usual ceramic spacers. Dividing the gap into two short, sturdy sections at top and bottom of the arrester increases mechanical strength.

Lens-shaped electrodes lengthen life of characteristic element

Like alternating current in a conductor, lightning surge current tends to "skin" down the outside of the arrester valve element. This "skin effect" characteristic lowers the surge capacity of ordinary arresters because only a small portion of the valve element cross-section area is used to handle lightning current. However, in L-M's Line Type Arresters, lens-shaped metallic electrodes shorten the electrical distance down the center of the valve element just enough to counteract the skin effect. The surge discharges evenly all through the valve element—and the arrester lasts far longer. The arrester can take *more* heavy surges . . . it maintains its high discharge capacity without change for years and years.

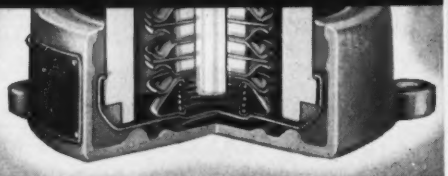


LM®

LINE MATERIAL ... Lightning Arresters

Complete Coordinated Equipment for Distribution Today

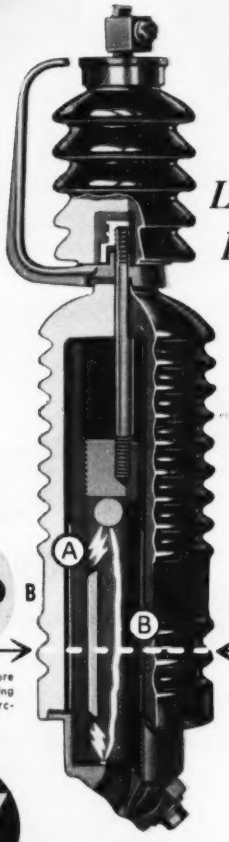
L-M type DL Line Type Arresters are available in 8 sizes from 20 to 73 kv, are heavily built, have many features to assure adequate protection with unchanging characteristics for a long, long time. Get Bulletin LA4; it gives you the whole story. Ask your L-M Field Engineer for a copy, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



37

This wedge blows out the arc

How L-M's arc-switching principle makes L-M expulsion arresters LAST LONGER!

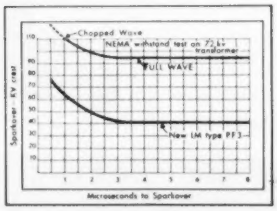


Cross section of fibre arcing plug, showing wedge-shape arc-switching chamber.

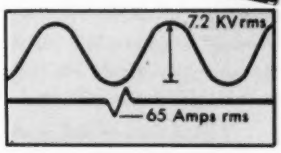
When a surge sparks over in an L-M type PF3 lightning arrester, the arc first jumps the short gaps at *A* (in the cutaway view). Since the arc is in the narrowest part of the wedge-shaped arcing chamber, gas instantly forces the arc over into a long, thin shape at *B*—then blows it out the bottom vent. Fast and sure, it operates in half a cycle or less.

The arc barely touches the electrodes before it's over and out. It doesn't last long enough to burn electrodes or fibre, so the arrester has a long, dependable, trouble-free life.

Better get the whole story from your L-M Field Engineer. Or write for Bulletin LA-3—address Line Material Company, Protective Equipment Division, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



New lower sparkover level of the 9 kv type PF3 compared with the NEMA minimum standard impulse strength of a 7200 volt transformer. (Other ratings show comparable margins of safety.)



Here a 35000 ampere surge was put on a 7200 volt line with 1200 amp fault current capacity. Because of gas pressure built up by this high surge, the arrester drew only 65 amps follow current, and cut that off in 1/10th cycle. The PF3 also amply meets accepted NEMA standards for lightning arrester performance. Now in seven ratings—3, 6, 9, 10, 12, 15 and 18 kv.

39

LINE MATERIAL ... Lightning Arresters

Complete Coordinated Equipment for Distribution Today

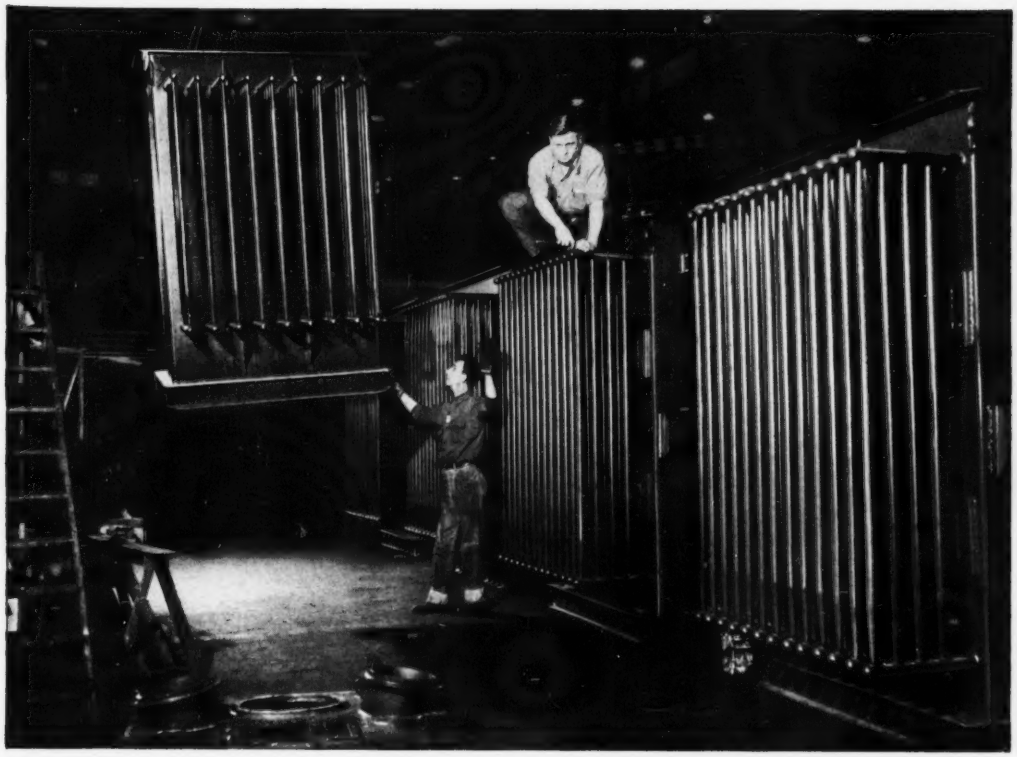
Eyes Right!

RIGHT LIGHTING

● The eyes have rigid requirements in efficient lighting. Smoot-Holman certified illumination meets those requirements with unvarying quality and performance created by superior engineering and skill. Beauty, high efficiency and dependable operation are the hallmarks of the finer lighting equipment that bears the Smoot-Holman label in institutional, commercial and industrial installations.

ILLUMINATION EQUIPMENT
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA ®
MADE IN U.S.A.

OFFICES IN PRINCIPAL WESTERN CITIES • BRANCH AND WAREHOUSE IN SAN FRANCISCO



Electric Utilities step up trend to RM * transformers

let's check this

1950 purchases of RM units up nearly 81% over 1949. Need for faster shipment, flexibility, seen as basic factors

Last year, 77 different electric utilities saved an average of 4 weeks in delivery time and 8 per cent in purchase price per transformer by specifying General Electric's RM power transformers. Their total 1950 buying resulted in an 80.6% increase in orders for standardized units.

This year, too, vital time can be saved. Right now, RM shipments are from 5 weeks to 5 months shorter, and prices are 8 per cent lower than for nonstandard units of similar ratings.

Are you *sure* you realize *how much* flexibility in application you can obtain and still qualify for RM savings? "Loadability" and voltage ratios, for example, are worth checking again—particularly with the need for faster delivery being what it is.

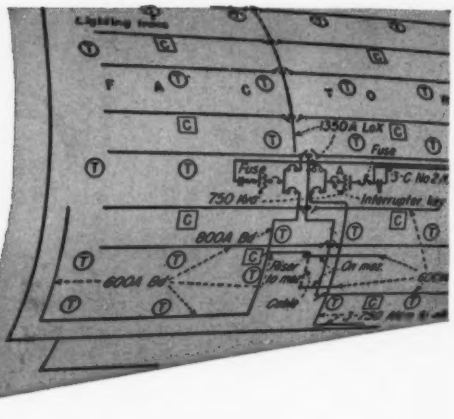
General Electric Company, Schenectady 5, N. Y.

* **"RM"** stands for Repetitive Manufacture and covers General Electric's standardized power transformers up to 10,000 kva. You can obtain many optional features—including primary voltages—and still qualify for RM price. Special engineering is eliminated on RM transformers. As a result, prices are lower, deliveries are shorter. Booklet GEC-479 contains full information.

GENERAL ELECTRIC

401-17

With Factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities



FOR EASY FISHING...

choose your conduit from Central's Big 4

You'll reduce hang-ups and kinked wires when you fish through Central Conduit. It's smooth and uniform inside, and makes-up tight to reduce hang-ups at joints.

Four types of Central Conduit let you pick the best one for each job. There are 3 types of full-weight rigid . . . "Cenlaco" with a hot-dipped galvanized finish inside and out . . . "Central White" with electro-galvanized zinc outside and black enamel inside . . . "Central Black" with black enamel inside and out . . . and "Central EMT", light-weight sturdy steel conduit that's electrogalvanized outside, black enameled inside.

All Central Conduit is approved by Underwriters' Laboratories and the National Electrical Code . . . and backed by our 111 years of tubular production experience.

Demand for Central Conduit far exceeds the supply . . . but your supply house is filling orders as quickly and as fairly as he possibly can.

SPANG-CHALFANT

Division of The National Supply Company

GENERAL SALES OFFICE: Grant Bldg., Pittsburgh, Pa.

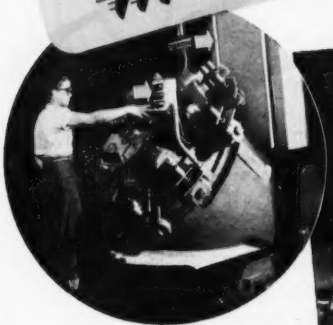
District Offices and Sales Representatives in Principal Cities

DESIGN LEADERSHIP IN ACTION!

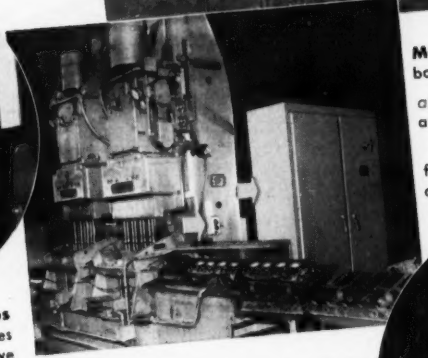
above • **Ingersoll Nine Station Machine** (partial view), milling and boring cylinder blocks.

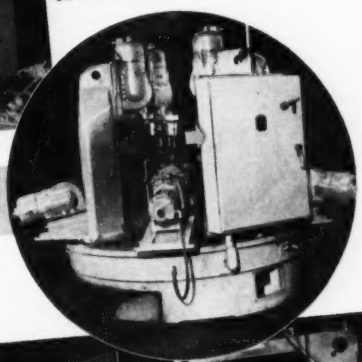
at left • **Foote-Burt Machine,** reaming and facing valve guides in cylinder heads.

below • **Kingsbury Machine,** chamfering and forming ball seat, and drilling oil hole on rocker arms.



above • **Krueger-Barnes Machine,** drilling 12 smoke holes in piston oil ring groove





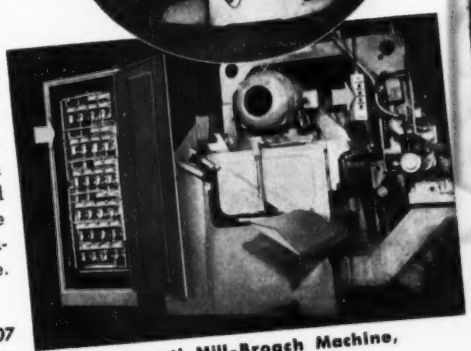
SQUARE D MOTOR CONTROL

operates every automatic machine tool in this New automotive engine plant

• These pictures show only a few of the tremendous battery of Square D controlled machine tools in one of the country's newest and most modern automotive engine plants.

There are sound reasons for selecting Square D. Unusual completeness of line satisfies virtually any AC or DC application requirement. Standardized components, each designed to perform a specific control function, are all physically proportioned to make up compact, attractive control panels. There is no wasted space—yet there is complete accessibility for speedy inspection and maintenance. Square D control is designed for machine tool service.

***Write** for Machine Tool Control Bulletin 207 describing Square D's complete line. Address Square D Company, 4335 Valley Blvd., Los Angeles 32, Calif.*



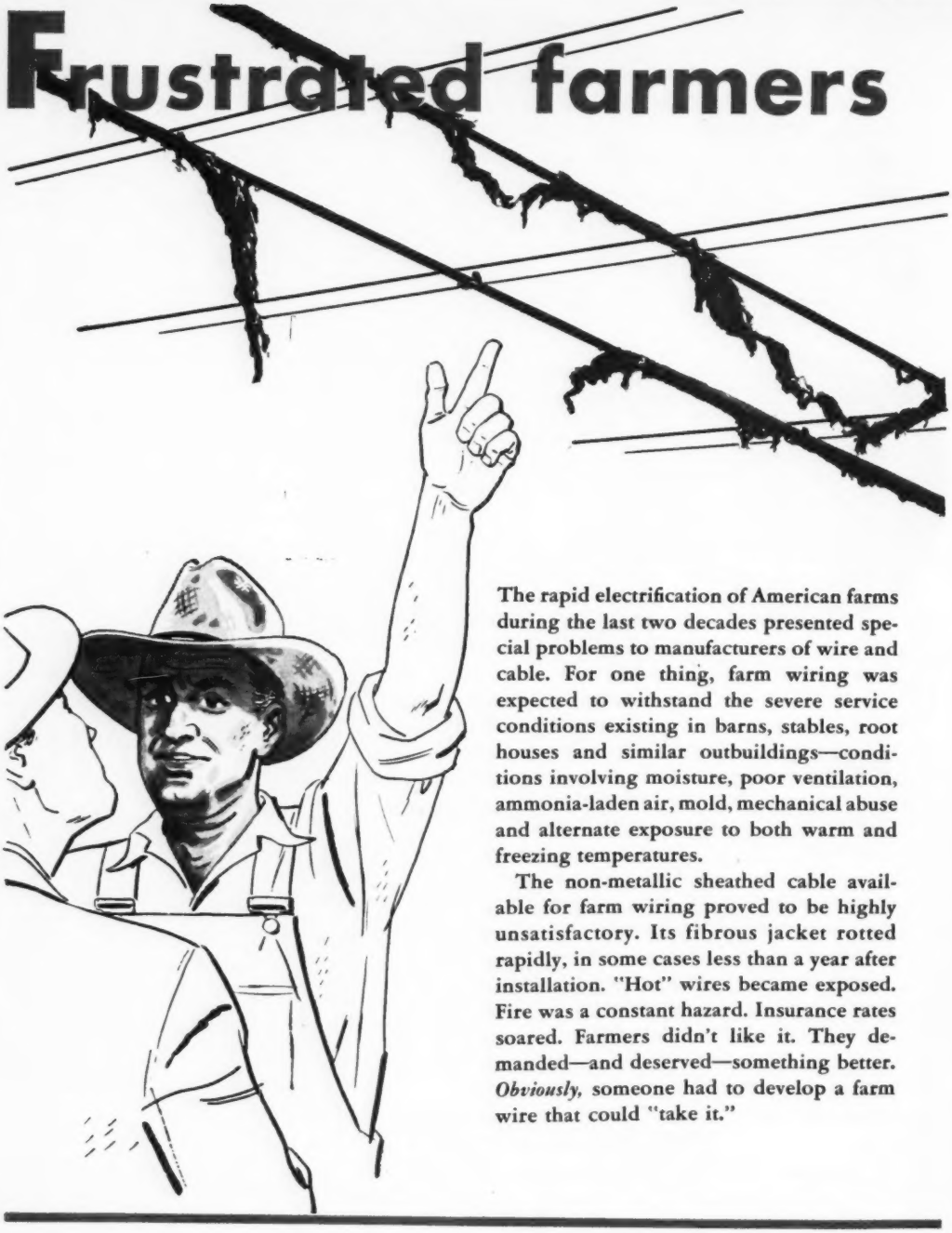
Cincinnati Mill-Broach Machine, milling and broaching cylinder heads.

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

Frustrated farmers



The rapid electrification of American farms during the last two decades presented special problems to manufacturers of wire and cable. For one thing, farm wiring was expected to withstand the severe service conditions existing in barns, stables, root houses and similar outbuildings—conditions involving moisture, poor ventilation, ammonia-laden air, mold, mechanical abuse and alternate exposure to both warm and freezing temperatures.

The non-metallic sheathed cable available for farm wiring proved to be highly unsatisfactory. Its fibrous jacket rotted rapidly, in some cases less than a year after installation. "Hot" wires became exposed. Fire was a constant hazard. Insurance rates soared. Farmers didn't like it. They demanded—and deserved—something better. *Obviously,* someone had to develop a farm wire that could "take it."

PIONEERING IS SIMPLY DOING THE OBVIOUS ***FIRST***

wanted action

SO...NE-o-PRENE LOOMWIRE*

NON-METALLIC SHEATHED CABLE

was developed

National Electric Products Corporation recognized the need for more satisfactory farm wiring and so intensified its development efforts in this direction. The old cable was completely redesigned. The result was NE-o-Prene Loomwire, the *first* neoprene non-metallic sheathed cable to be listed and approved by Underwriters' Laboratories, Inc. for use in wet locations. Since that time, using the design and construction originated by National Electric, other manufacturers have placed neoprene jacketed cable on the market which has met with U.L. approval. But *with the standards set by NE,* the frustrating problem of farm wiring has been solved.

For more than 40 years, National Electric has "set the standard" for everything in wiring—the world's largest producer of the *complete* line of secondary electrical distribution systems.

*Reg. T. M., N.E.P. Corp.

Construction Details

COPPER CONDUCTORS
NEOPRENE INSULATION
SPECIAL RUBBER SPACER
FIBERGLAS BRAID
NEOPRENE JACKET

EVERYTHING IN WIRING POINTS TO

National Electric
PRODUCTS CORPORATION
1308 CHAMBER OF COMMERCE BLDG., PITTSBURGH 19, PA.

IVAN is watching you

IVAN is a dyed-in-the-wool Communist. There are only 6 million party members like him in all Russia, yet these Communist brass-hats enforce the iron dictatorship of the Kremlin over *200 million* Russians.

He's sold to the hilt on Red ideas. Which means he's out to get *you*. He believes it's either you or him . . . that the world is too small for both.

Ivan is working hard to beat you down. He has a big head start.

Right now he's got you in a bad spot.

Ivan is afraid of only one thing.

He fears your ability to out-produce him in guns, tanks, planes.

Frankly, he doesn't think you value your free system enough to do it . . . to make willingly the sacrifices he has squeezed out of the Russians.

But he's wrong!

Because you and all of us have set out to build more and better weapons—to do it faster all the time.

We must use every bit of know-how and inventive skill we have to improve our machines and methods—to turn out more and more for every hour we work. Only in this way can we become militarily strong.

But we've got to supply essential civilian needs as well. We can't allow needless shortages to take prices skyrocketing and lower the value of our dollar.

Sure, that means sacrifices for everybody. But doing this double job well is the only sure way to stop Ivan in his tracks—and to save the freedoms which are ours and which he has never known.

FREE . . . this important booklet tells you how our American System Grew Great

How Americans developed better machines, power and skills to build a great nation . . . Why we have been able to produce constantly more per hour . . . How this has given us the world's highest living standard.

How we can meet today's challenge—Why we must expand our productive capacity . . . supply arms and essential civilian needs, too. Read how this dynamic process works in free booklet, "The Miracle of America," endorsed by representatives of management and labor. Send for your free copy today!

MAIL THE COUPON—
The Advertising Council, Inc., 25 West 45th St., Dept. B. P. New York 19, N. Y.

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This advertisement, approved by representatives of management, labor and the public, is published in the national interest

ELECTRICAL WEST

THE BETTER WE PRODUCE
THE STRONGER WE GROW

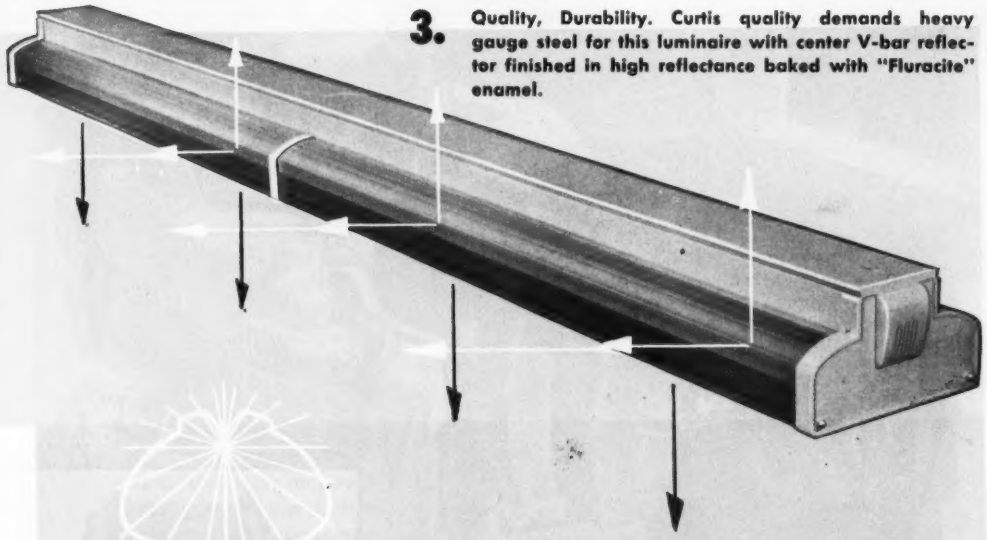
getting down to brass tacks on industrial lighting . . . . . .

means assessing the functional value of a luminaire. For example, here is the **CURTIS "INDUSTRIALIST"**, a scientifically designed lighting unit which, through careful engineering, provides these basic factors:

1. Direct-Indirect illumination. As shown by the typical curve, the indirect component distributed through fine ribbed polystyrene plastic distributes light to the ceiling and reduces severe brightness contrast. The direct component provides high levels of uniform illumination on working surfaces.

2. Ease of Maintenance. The open design of the "Industrialist" facilitates maintenance . . . side panels are quickly and easily removed for cleaning without use of tools.

3. Quality, Durability. Curtis quality demands heavy gauge steel for this luminaire with center V-bar reflector finished in high reflectance baked with "Fluracite" enamel.



Typical Curve

4. Ease of Installation. Close ceiling or pendant mounting is available either for individual units or continuous lines.

5. Flexibility. Curtis Industrial luminaires are designed for use with 4, 6 and 8′ fluorescent lamps.

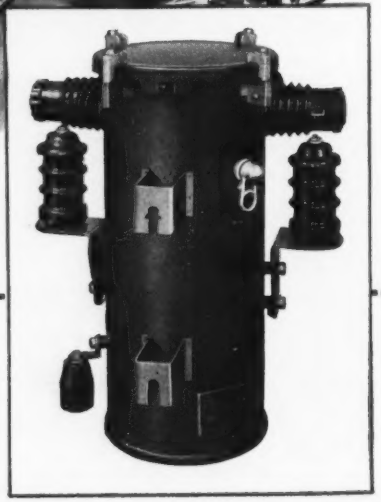
CURTIS
LIGHTING, INC.
6135 W. 65th Street
Chicago 38, Illinois

Send coupon today for complete information.

CURTIS LIGHTING, INC.
Dept. E16-14, 6135 W. 65th St.
Chicago 38, Illinois

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____

YOU CAN BE SURE.. IF IT'S
Westinghouse



A new line of "CSP" Transformers, with wall-mounted, high-voltage bushings and "De-ion®" arresters. Easier to install, with improved pole clearance. New, extra-strength bushings have large unbreakable "Enrup*" knobs for fast, positive hand-tightening of leads. Convenient location of arresters and brackets facilitates adaptation to wye or delta systems.

*TM Reg. U. S. Rubber Co.

Eliminates 80%

of your service calls

Here's how a large midwest utility credits "CSP®" (Completely Self-Protecting) Transformers with greater savings . . . better personnel relations, too, because they alleviated a costly problem:

"No one liked the necessity of calling out a full crew in the middle of the night to restore service on a conventional transformer because of a simple fuse outage. *'Midnight Nuisance'* is the term we applied. Our linemen used even stronger language.

"Now, 'CSP' Transformers give ample warning of overload conditions. The Emergency Control provides reserve capacity to forestall outages until change-outs are convenient. Since we've standardized on 'CSP' Transformers, we've practically eliminated the *'Midnight Nuisance'.*

"Our line crews prefer their greater freedom from emergency calls . . . and our comptroller appreciates the savings!"

One sure fact stands out: "CSP" Transformers cut service costs

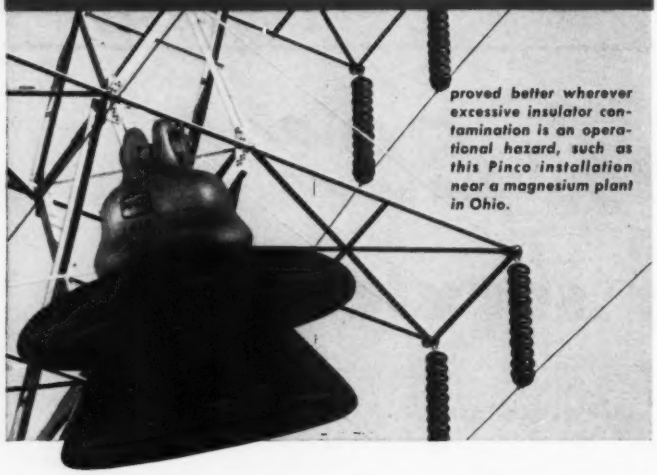
Get the full story on how Westinghouse "CSP" Transformers, with built-in lightning and thermal protection, can cut distribution costs for you. Ask your Westinghouse representative for a copy of booklet B-4249-A, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh, 30, Penna.

J-70568

Westinghouse "CSP" TRANSFORMERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

RIGHT for the JOB... RIGHT ON THE JOB!



proved better wherever excessive insulator contamination is an operational hazard, such as this Pinco installation near a magnesium plant in Ohio.

Competitive Tests...Service Records Prove the Superiority of PINCO L1612 "Universal" Insulators

In competitive "fog operation" tests conducted by a Western power company, Pinco L1612 Insulators rated . . .

FIRST on "fog arc over."

FIRST on sustained voltage "in fog" . . . NO arc over.

FIRST on sustained voltage "in direct spray" . . . NO arc over.

FIRST on both self-cleaning and manual cleaning characteristics.

SECOND on "sluice arc over."

EXCELLENT on radio interference characteristics.

We're proud that Pinco Insulators were so conclusively proved "right" by such laboratory tests. But we're even more proud to know that in actual operation under "fog" conditions, thousands of Pinco L1612's have been meeting their job requirements 100% on installations *made eighteen years ago!* Such a record of trouble-free service proves that they're "right" where it counts . . . "right on the job!" So when you have a tough job for insulators calling for L1612 characteristics . . . put up Pinco *to be sure!*

See Page 70, Pinco Catalog No. 49 for complete electrical and mechanical characteristics.

The Porcelain Insulator Corporation
769 Main St., Lima, N. Y.
Warehoused and Distributed by JOSLYN PACIFIC CO.
1234 FIRST AVENUE SOUTH . . . SEATTLE 4, WASHINGTON
100 POTRERO AVENUE . . . SAN FRANCISCO 3, CALIFORNIA
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. . . Distribution Clamps . . . Distribution Pin Types and Guy Strains . . . Transmission Line Fittings . . . Tree Insulators . . . Transformer and Circuit Breaker Bushings . . . One Piece and Multi-part High Voltage Pin Types . . . Suspension and Strain Clamps . . . Indoor Bus Support Porcelain . . . Lightning Arrester Porcelain

PINCO INSULATORS

ELECTRICAL BOOKS

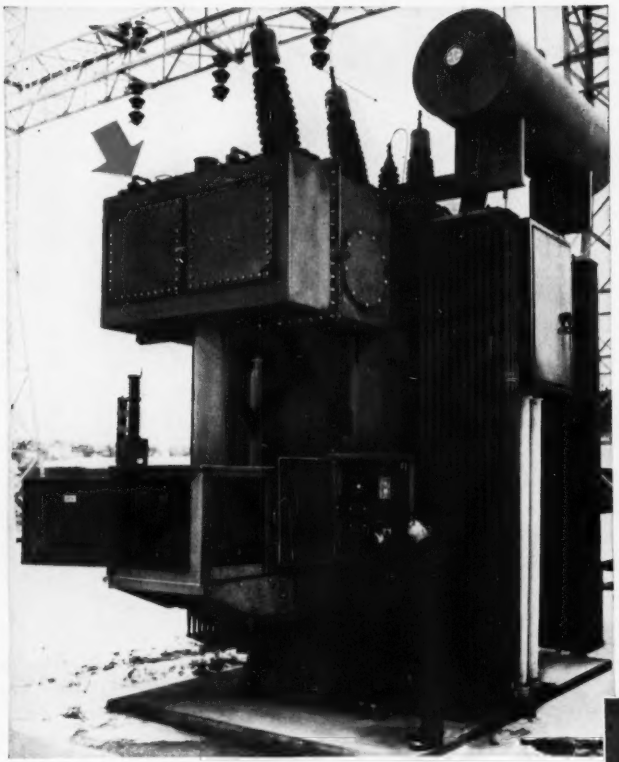
PROPAGATION OF SHORT RADIO WAVES, MIT Radiation Laboratory series, edited by Donald E. Kerr, 728 pages, 6x9, McGraw-Hill Book Co., $10. Because of the intensive development during the second world war of radar and communicative equipment operating at frequencies above 100 mc/s, considerable effort has been directed toward investigating the propagation characteristics of radiation at frequencies too high to be affected by the ionosphere. It is the purpose of this book to collect and summarize the results of these investigations in such a way that they will be readily available to present and future workers in this field.

TRANSFORMER ENGINEERING, second edition, L. F. Blume and four associate engineers of the Transformer Engineering Division of General Electric Co., 500 pages, 6x9, John Wiley & Sons Inc., $7.50. The book is a treatise on the theory, operation and application of transformers designed to help the engineer solve the many technical problems involved in the specification, selection, application and operation of transformers. The second edition is a detailed study of every phase of transformer performance. Connections, phase angle, load ratio control, characteristics of insulating materials, coordination of insulation, thermal characteristics are a few of the more important items covered. Recent advances in transformer engineering, particularly those relating to insulation, thermal characteristics and load ratio control practice are included in this edition.

EFFECTIVE TEACHING, by Fred C. Morris, 86 pages, 6x9, McGraw-Hill Book Co., 60c. This manual for engineering instructors was prepared under the sponsorship of the Committee on Teaching Manual of the American Society for Engineering Education.

INTRODUCTION TO SERVOMECHANISMS, by A. Porter, 154 pages, 4x6½, John Wiley & Sons Inc., $1.75. This book is another in the series of monographs on physical subjects. The book is based on a course of lectures given at the Military College of Science as one of the main subjects in the second year of the Technical Staff Officers' Course. It is not intended for the student who wishes to specialize in the theory and design of automatic control systems and servomechanisms, but rather for the physicist, physiologist, engineer and others who are merely interested in the subject. Elementary examples and theoretical foundations of the subject are given with particular emphasis on the basic problems of servo design.

PLANT LAYOUT, by Randolph W. Mallick and Armand T. Gaudreau, 391 pages, 6x9, John Wiley & Sons Inc., $7.50. This is a practical book filled with material culled from years of actual experience and now organized and presented as an engineering science. The book is written for the administrative executive and plant engineer primarily, but has also been developed as a handy guide for senior and junior engineers, and as a reference for engineering colleges and schools of business administration.



106,554 tap changes since 1947

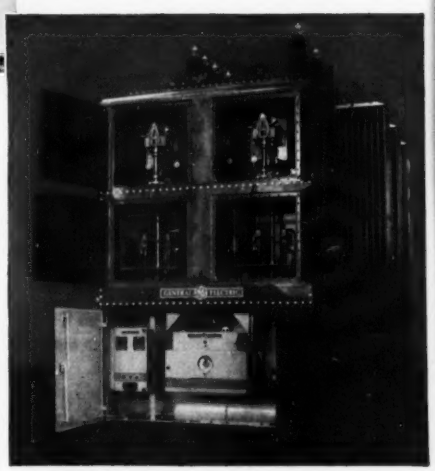
Arcing tips inspected, found good for 400,000 more operations

At its current rate of operation the load-ratio-control equipment on this G-E transformer at Lewiston, Maine, will require no servicing until about 1962.

Central Maine Power Company recently inspected the load-ratio-control equipment on this transformer rated 13,333 kva (with fans), 115,000Y to 12,000-volts. This was the first opportunity the company had to inspect contacts since installation in 1947. The counter read 106,554 tap changes under load. Here are pertinent parts of the report:

> *"Arcing tips are in good condition, and should last 500,000 tap changes as estimated in the G-E Instruction Book. All bearings, pins, cam rollers and cam surfaces are in excellent condition and show no wear. Oil was slightly carbonized and insulating rods and panel showed some carbon streamers, but there were no carbon deposits in the areas protected by electrostatic shielding. Oil was filtered and re-used. Surfaces were cleaned."*

This report is typical. *At its present rate of operation, this equipment will not require further servicing for about 11 more years.* General Electric has now installed load-ratio-control equipment on 37,665,618 kva of transformers—and the reliability record matches the outstanding record of the transformers themselves. *General Electric Company, Schenectady 5, New York.*



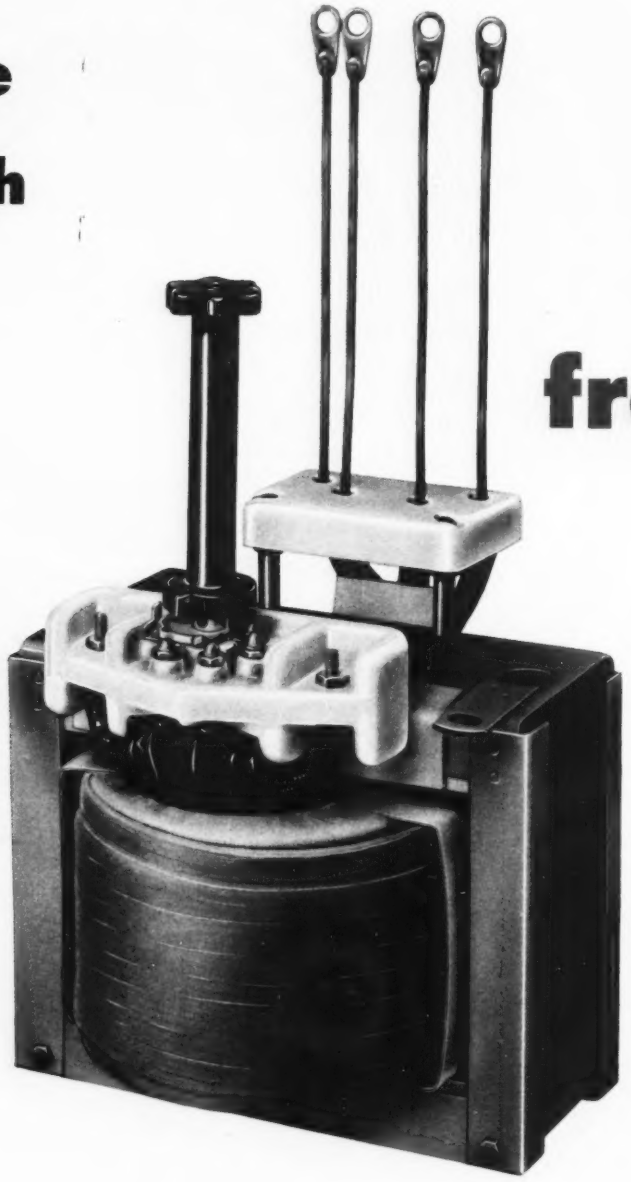
On more recent G-E transformers the contactor compartment is below the one for tap selectors instead of in front of it, to further improve accessibility. The motor drive has also been made more accessible and all controls have been grouped on a hinged panel for operating convenience. Basic design, however, remains unchanged, including electrostatic shielding that prevents dangerous carbon deposits.

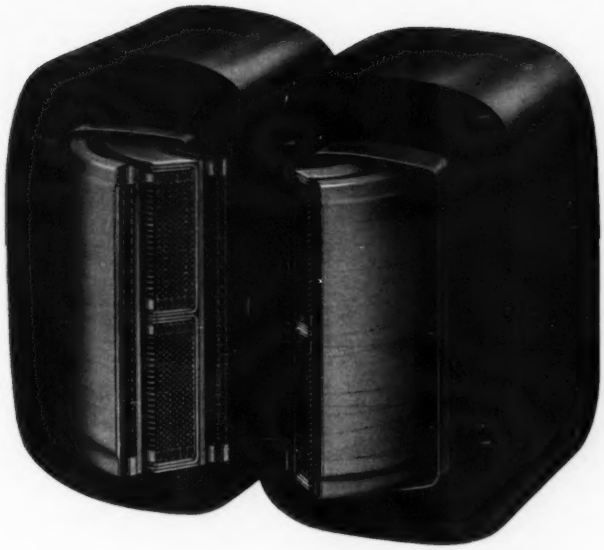
401-20

GENERAL ELECTRIC

SPIRAKORE* TRANSFORMERS

high impulse strength from





improved coil design

If your experience is typical, roughly half of your distribution transformer failures can be charged to lightning. But on your Spirakore* transformers delivered since 1943, you will find that lightning failures have been almost insignificant.

Reason? Eight years ago, General Electric engineers made discoveries about impulse strength that led to a strategic rearrangement of coil insulation and spacing. What that change accomplished *for you* can now be seen in your own records.

Important as this is, it is still only one advantage you get with today's Spirakore transformers. You get a wound core in *all* single-phase and most three-phase ratings—a G-E development that has resulted in direct savings to utilities of millions of dollars. You get an improved clamping construction for greater mechanical strength. You get vacuum-tight sealing that stops breathing, prolongs oil and transformer life. You get an improved Melaglyp† paint that increases durability to weathering by 50 per cent.

All of these changes have kept Spirakore ahead—kept it the standard for others to try to equal. It's the finest distribution transformer you can buy.

General Electric Company, Schenectady 5, N. Y.

*Registered trademark of the General Electric Company

†A new, greatly improved G-E paint made with melamine-modified Glyptal (registered trademark of the General Electric Co. for alkyd resin).

GENERAL ELECTRIC

402-100

This cutout is liberally designed—has high dielectric strength, uses silver-plated contacts, provides full-range interruption of fault currents, and is conservatively rated as to interrupting capacity. All live parts are completely enclosed for maximum safety.

4 CUTOUTS IN ONE

by simply changing doors

AND THAT'S ONLY HALF THE STORY! By stocking only three interchangeable doors which fit both 5.2 and 7.8 kv, 50-ampere housings, you get the 4 operating functions illustrated below—a total of eight essential cutout combinations! Available also in 100-ampere ratings, this unique flexibility reduces inventory and simplifies stocks.

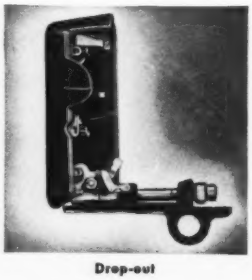
INDICATING OR DROPOUT WITH A TWIST OF THE WRIST! A small wire yoke, easily inserted or removed, determines whether the fuseholder door "kicks out" at the bottom for visual indication, or drops open—either way giving positive evidence of a blown fuse.

RECLOSING DOOR AVOIDS UNNECESSARY SERVICE TRIP! The two-element reclosing door restores service within one second after a temporary fault blows the first fuse link. By avoiding an extra service trip, the two-shot cutout pays for itself the first time it operates!

FLEXIBLE DISCONNECT BLADE CAN'T GET LOST! It's fastened to the door—can't be misplaced. This disconnect blade doubles the continuous current rating of the cutout. When the blade is disconnected and the door closed, the flexible cable extends downward to indicate that the circuit is open.

Only G.E. offers you this flexibility of cutout applications. For complete information contact your G-E sales representative, or write for Bulletin GEA-3448. *General Electric Co., Schenectady 5, New York.*

Indicating


Drop-out

Reclosing

Disconnect

GENERAL ELECTRIC

406-39

TRAVELING WAVES ON TRANSMISSION SYSTEMS, second edition, by L. V. Bewley, 542 pages, 6x9, John Wiley & Sons Inc., $12. The book presents in compact and usable form the modern theories of transient surge phenomena on electric power lines and in transformer windings. These theories reduce the design of lightning-proof transmission lines to a routine procedure and provide a basis for the most economical choice of protective features required for any desired degree of operating reliability. This second edition, consolidating theories and methods of analysis, has been greatly enlarged to include the many new developments in the field since the publication of the first edition.

THEORY AND APPLICATION OF INDUSTRIAL ELECTRONICS, by John M. Cage, 289 pages, 6x9, McGraw-Hill Book Co., $4.75. An integrated treatment of electronic circuits and devices outside the field of communications. Specifically, it covers electronic instrumentation of both electrical and nonelectrical quantities; electronic control including servomechanisms; and electronic power, including d-c power, induction heating, and dielectric heating. Many applications are described without being superficial or vocational. The theoretical approach is sound, although mathematics is not employed to the point of obscurity.

PRINCIPLES OF ELECTRICAL ENGINEERING, third edition, by Grover C. Blalock, 605 pages, 6x9, McGraw-Hill Book Co., $5.50. This text is particularly lucid, presenting fundamental principles in concise form with frequent reference to practical applications. Examples, illustrating these applications, are used freely and there is a suitable list of problems, using such data as have been found to apply in practical machinery and circuits. In the third edition, all material has been carefully reviewed and additional material inserted. A new chapter on Dielectric Fields and Circuits has been added and the treatments of d-c and a-c networks considerably expanded. Electronics receives extended treatment, both as to theory and application, with the application of electronic devices in that industry given particular attention.

ALTERNATING CURRENT CIRCUITS, third edition, by Russell M. Kerchner and George F. Corcoran, 598 pages, 6x9, John Wiley & Sons Inc., $5.50. The book thoroughly covers the theory and practice of alternating-current circuits, with particular emphasis on fundamentals. These fundamentals now include an introduction to active network analysis, a more basic approach to the concepts of attenuation and phase shift, and a straightforward method of designing double-tuned circuits. Important changes in the third edition include information pertaining to the Q of electrical circuits; Nodal method of circuit analysis; an additional method of wave analysis; a method of designing tuned coupled circuits; and the three-origin vector diagram of a polyphase circuit, particularly useful to power engineers.

TRANSIENT ANALYSIS IN ELECTRICAL ENGINEERING, by Sylvan Fich, 306 pages, 6x9, Prentice-Hall Inc., $7.35. The first purpose of the text is to extend transient analysis in electrical engineering to include modern operational methods, without eliminating the presentation of classical theory. It reflects the author's belief that an understanding of both classical and operational methods is an essential component of the training of a modern engineer. The only prerequisites for understanding the subject matter are the conventional courses in calculus, college physics and steady-state circuit theory. Alternating-current circuits can be studied simultaneously with transients, as presented in the text. No previous knowledge of differential equations is assumed.

SHORT WAVE WIRELESS COMMUNICATION, fifth edition, by A. W. Ladner and C. R. Stoner, 717 pages, 6x9, John Wiley & Sons Inc., $8. This has the advantage of being a British book in a field in which English scientists have worked more intensively than those of any other country. The need for communication with the far-flung British Empire caused this special interest in short-wave, long-range communication. The fifth edition, written by two of England's leading authorities on short waves, reflects this vast experience. Much of the information in the book has previously been available only in English books and journals. The book constitutes a thorough study of the principles of short and ultra-short waves, designed to satisfy the needs of both professionals and amateurs interested in short-wave communication.

ELECTRIC ILLUMINATION, second edition, by John O. Kraehenbuehl, 446 pages, 6x9, John Wiley & Sons Inc., $8. Principles underlying the specification and design of electrical lighting for commercial and industrial buildings are presented. Essentials of adequate and safe lighting systems are stressed. This new edition incorporates the changes and developments that have taken place in the field since publication of the first edition. Important topics included are objective and subjective specification of illumination, color and shadow, illumination from point, line and surface sources, light control, luminous architectural elements, floodlighting, novelty lighting, and maintenance and economics.

APPLIED NUCLEAR PHYSICS, by Ernest Pollard and William L. Davidson, second edition, 350 pages, 6x9, John Wiley & Sons Inc., $5. Applied Nuclear Physics has been expanded to include the progress in the field since 1942. In simple, concise language the book gives a clear picture of practically all phases of nuclear science including the basic facts of nuclear particles and radiations and methods of accelerating them, transmutation, natural and artificial radioactivity, isotopy, and nuclear fission. Enough detail is supplied so that the reader can apply the techniques of nuclear physics to research problems with some facility.

WAVEGUIDE HANDBOOK, MIT Radiation Laboratory Series, edited by N. Marchuvits, 428 pages, 6x6, McGraw-Hill Book Co., $7.50. Presents in compact form all currently available data, and some experimental data, on the properties of microwave transmission lines, microwave circuit elements (obstacles, windows, discontinuities, bends, junctions and couplings) and of some other structures, such as cavities, which may be considered as composites of these. Data are given in the form most easily applied in practical circuit design. Theoretical results are stated in analytical form, but the greater part of the book consists of graphs presenting results in numerical form. When theoretical results are not available, experimental results may be given. Textual material is restricted to that needed to explain the form of presentation.

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is obsolete wiring

from this

ANACONDA "POWER UP"
CAMPAIGN HELPS UTILITIES
HERE IS another advertisement in the Anaconda "POWER UP — And Be Prepared" campaign urging industry to make more efficient use of the power it buys from you. This Anaconda campaign is also being directed to contractors and wholesalers.
As in our previous industry-wide campaigns, we again offer advertisement reprints, imprinted with your letterhead and message —for mailing to your industrial power customers.

the right cable for the job

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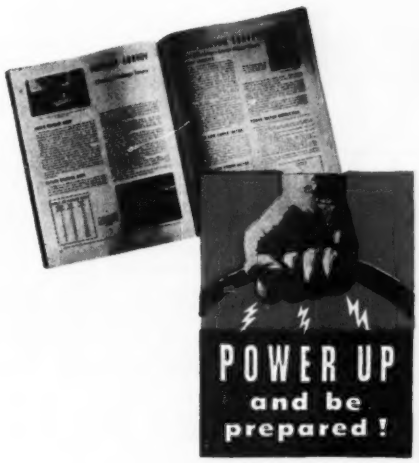
SURVEYS SAY, YES! Overloaded circuits and inadequate electrical equipment are stealing power and profits from 9 out of 10 industrial plants—a fact established by industrial surveys.

UTILIZE THE POWER YOU PAY FOR. Obsolete wiring systems cut down production . . . lose valuable man hours . . . and weaken the potent industrial power that is so vital to the strength of our national defense.

POWER UP AND BE PREPARED for greater production, lower costs and a stronger national defense. Call in your utility, consulting or plant power engineer or your electrical contractor. Find out the condition of your plant wiring system today and prevent a possible breakdown tomorrow.

AND DON'T FORGET to send for your copy of "*Power Up—And Be Prepared,*" a straight-to-the-point guide to wiring systems and maintenance. It helps you effectively survey your own wiring system. Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.



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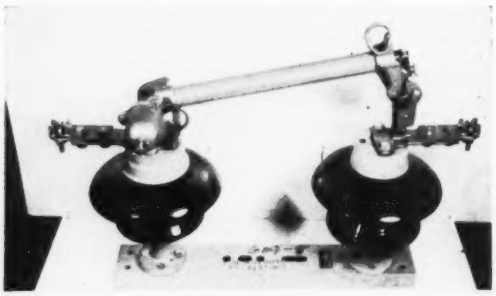
WIRE AND CABLE

PRODUCT NEWS



Fuse Tubes Interchangeable

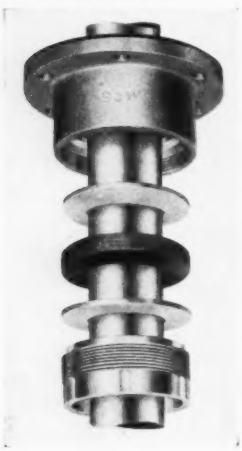
(1) Southern States Equipment Corp., Hampton, Ga.

A new development in the manufacturer's expulsion power fuse line features complete voltage ratings. By changing or replacing the fuse tube assembly, eight combinations of continuous current and interrupting capacities are possible in each kv rating. In one operation this fuse can be converted to meet any one of a variety of load conditions, it is stated. Another feature is a completely housed snubber that brings the opening tube assembly to a cushioned, shock-free stop.

These fuses have been classified LB, MB, and HE and are available in 7.5-kv, 15-, 23-, 34.5-, 46- and 69-kv ratings.

RS Cable Entrance Seal

(2) G&W Electric Specialty Co., 7780 Dante Ave., Chicago 19, Ill.



The new type RS cable entrance seal uses bushings of Resistoyl rubber material compressed in a stuffing box to form a pressure-tight, oil- and moisture-proof seal on all types of leaded and non-leaded cables.

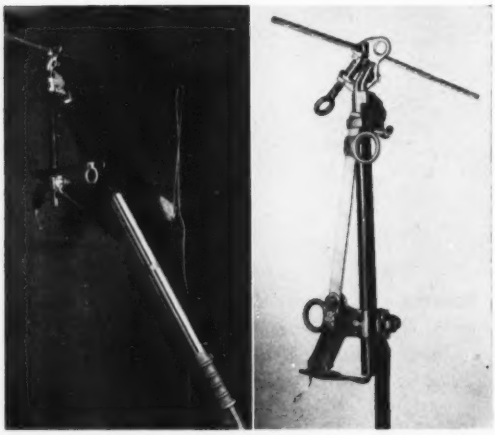
Bushings of Resistoyl material are held between metal discs and compressed by tightening a gland nut. Since the bushings are a part of the cable entrance, the proper mass of material to form an effective seal is always present when the entrance is installed.

Fittings for use with conduit and wire or tape armor are available for use with the RS cable entrance. Details are given in G&W Forethought E3-16.

Packaged Pole-Top Capacitors

(3) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A small pole-top packaged capacitor bank consists of nine 25-kva capacitor units and three solenoid-operated type CSO-1 switches. The equipment is factory assembled, wired, tested and delivered ready to hoist into place on the crossarm. Three line and three control wire connections are required to put the equipment into service. Available with either nine or 12 capacitors, rated 15 or 25 kva, 2,400 to 7,960 volts.



Temporary Load Break, Load Pick Up Switch

(4) A. B. Chance Co., Centralia, Mo.

This temporary load break, load pick up switch is claimed to give a means of removing taps from conductors under load conditions, where there are no reclosers or circuit breakers, without pitting or burning the conductors or clamps and without drawing long arcs that hazard phase to ground or phase to phase faults.

When loaded branch circuits that have been out of service must be reconnected to main line conductors, the temporary load switch can be used as a pick-up device giving the same protection to line and equipment.

The device combines a disconnect switch and flexible link connection. After the switch blade is pulled, the link connection is broken by tripping the trigger to release the link intact.

Using this temporary load switch, cutouts may be opened safely on loaded circuits by jumping around them, with the load switch jumper, to bypass the circuit while the cutout is opened manually, then breaking the circuit by pulling the switch blade.

According to the manufacturer, disconnecting capacitors or opening disconnect or sectionalizing switches under conditions that might produce long uncontrolled arcs may also be done with the device.

A user REPORTS...

After their satisfactory experience with the 500,000 C. M. insulated aluminum cable (at right), National Supply Co., Torrance, Cal., says, "We will seriously consider aluminum when similar installations are planned." These cables, insulated with RH 600 v. U. S. Paracore, are connected to bus, from which they carry current to distribution panels for such heavy loads as welding machines, shears, rolls and other equipment.

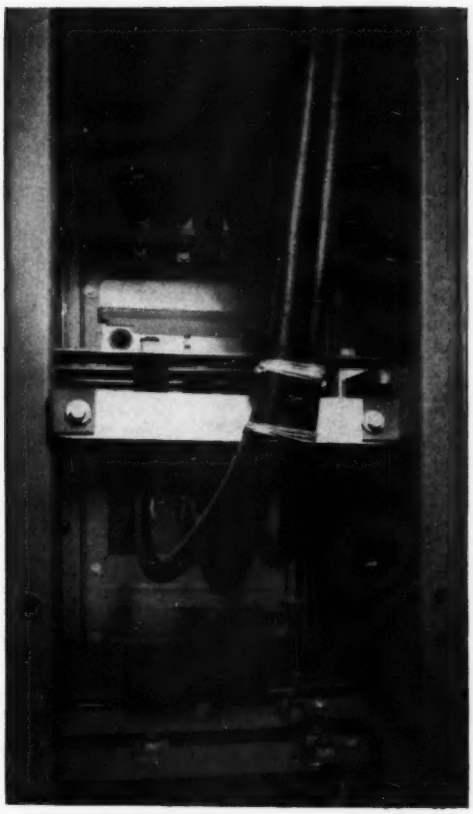


figure it in ALUMINUM and you figure it low

When you plan new production lines, add feeders for heavier loads, get prices both ways—in aluminum and in copper. You'll find you can make worth-while savings with aluminum . . . and installation is faster, easier because of aluminum's light weight.

Although the rearmament program restricts the use of aluminum, we are ready to help you with the planning for trouble-free, low-cost wiring.

FREE INSTALLATION BOOK

"Questions and Answers" on installation of aluminum conductors. Write for it now — Aluminum Company of America, 1777E Gulf Bldg., Pittsburgh 19, Penna.

Aluminum Conductors

ALCOA ALUMINUM

of ALCOA EC ALUMINUM are made by leading manufacturers

ADVERTISEMENT

WE MADE several attempts to write a conventional ad telling you about the new Line Post insulator. It just couldn't be done. There wasn't space to tell the story and the unsupported claims for this new insulator sounded too strong to be believed. What we really would like would be to sit down at your desk with a sample of the Line Post and talk it over with you for a few minutes. So, if we may invite ourselves in, let's pretend we are doing just that, using the photograph as a poor substitute for the insulator.

The Line Post is used wherever pin type insulators are used. It sets directly on the cross arm and is held in place by a center stud attached to the malleable iron base, and going through the cross arm like the stud of an ordinary pin. The conductor rests in the groove in the top and is tied in place in the usual way. Strength is the same as that of an ordinary insulator and pin.

The insulator, as you see, consists of a porcelain post which is cemented into a base. There are two or three important points along this line. The porcelain is *one piece* and is hollow, the hole being closed at the top by a thick section of porcelain. The base grips the porcelain from the outside only. There is nothing within the insulator. The hole is closed at the lower end by a rubber plug slipped in place before cementing. The insulators come equipped with the stud and need no pin. The base is designed for use with flat arms. For crowned arms a roofing washer may be used.

66-KV. LAPP LINE POST

Now that you know how it is made you are probably wondering, "Just how will this insulator help me?" Well, in many ways, but suppose we tell you by going over the various characteristics that most people would like to have in their pin type insulators and see how the Line Post meets them.

RADIO INTERFERENCE—The Line Post *produces no interference* at the rated neutral voltage with a margin of safety ranging from 20% for the 66 Kv size to about 100% on the smaller ones. Loose or dirty tie wires do not lower this starting voltage very much, thanks to the new tie head. Briefly, the high voltage at which interference (and corona) starts is due to the small amount of charging current which this insulator requires. In other words, it has a very low capacitance—about one tenth that of an ordinary unit. The low capacitance results from the wide separation of the live terminals. Freedom *from interference comes from the design itself and does not depend on special treatments or coatings many of which have already proved to be temporary in nature.**

PUNCTURE is almost impossible in the Line Post because the puncture path is practically the same length as the flashover path. The insulator will invariably flash over. The duty on the porcelain is very mild and no thin section can be subjected to high electrical stress.

CRACKING—Insulator cracking results from the porcelain being loaded in tension. Some bursting force from within becomes so great that the porcelain can no longer bear it and the shell cracks. In the Line Post there is nothing within the insulator to exert such bursting forces. The hardware is cemented externally to the one piece porcelain with a large area, low intensity compression grip. Temperature changes between the base and porcelain can load the porcelain only in compression and it is very strong (50,000 to 75,000 pounds per sq. inch) in compression. *A most important point is that the safety of the Line Post comes from the design itself and does not rely on special treatments, test or assembly methods.*

BEHAVIOR UNDER POWER ARCOVER—Until we learn how to build lines which will never flash over the ability of the insulator to go back in service after power arcover will be important. The Line Post gets its leakage and flashover distance from many short, sturdy flanges rather than from broad, spreading shells. Tests and operating experience show that short petticoats of this type are much less subject to damage than are the large ones. If under most severe conditions one or two flanges are lost you can see that the flashover and leakage distances are lowered very little.

MECHANICAL ATTACK—The same qualities that make this insulator behave well under power arcover protect it from serious damage under mechanical attack. Tests show that stone and shot gun attacks at reasonable distances will do no damage. Rifle fire may rip off a petticoat. But—you haven't lost any appreciable percentage of the electrical characteristics and the insulator will surely stay in service. The leakage distance for a given rating is originally about 50% greater than that of a conventional insulator.

DIRT CONDITIONS—Six years experience with Lapp Fog Type insulators leaves no doubt as to the effectiveness of this type of leakage surface for such conditions.

APPLICATION—The Line Post may be used in either new or existing lines. *In all respects it is a general purpose insulator.* There are, however, certain locations in which it is especally appropriate to try out these units. Field experience indicates that insulator radio interference does not travel far along the line. It is an entirely practical matter to replace present units in a residental area with Line Posts, correcting local conditions and using the old insulators for maintenance. This can be done at very little cost over that necessary for regular operation. They may also be used to correct dirt conditions, in locations where mechanical breakage is severe or where lightning flashovers are common.

Based on over two years' completely successful operating experience under a wide range of climatic conditions, these insulators give promise of permanently correcting many of the defects of conventional insulators. We urge you to give these insulators a trial under the worst conditions on your system.

Ask for Bulletin No. 112 with full details and catalog information.

Thanks for your time and attention.

*See paper, "A New Porcelain Post Insulator" by G. W. Lapp

LAPP INSULATOR CO., INC., LEROY, N. Y.

THIS IS THE FIRST ADVERTISEMENT OF THE LAPP LINE POST TO APPEAR IN ELECTRICAL WORLD

The Lapp LINE POST has a 20-YEAR service record

IT WAS "STRONG TALK" THEN . . .

. . . IT'S A PROVED RECORD TODAY!

If you've been a regular reader of Electrical World for 20 years, you probably saw this advertisement reprinted across the page. You probably agreed that such "unsupported claims for this new insulator sounded too strong to be believed."

But you may have read on, down to the punch-line "We urge you to give these insulators a trial under the worst conditions on your system." You might even have had a condition so bad that you were willing to give this untried and "radical" design a trial. If so, you can write the rest of this particular advertisement as well as we can. For a lot of fine engineers in a lot of fine companies *did* act on that suggestion. Never did an insulator have a more severe baptism-under-fire, nor a better chance to prove its merit. Wherever lightning was worst . . . wherever kids shot down insulators as fast as maintenance crews could put 'em up . . . wherever radio interference drowned out Amos 'N Andy . . . wherever scrub-brush-and-bucket brigades couldn't keep up with salt fog or industrial contamination . . . wherever insulation of transmission lines was next-to-impossible duty for conventional insulators, Lapp Line Posts got a trial.

What's the record of accomplishment? Why, most of the companies that made those early "trouble-spot" trials are the companies which have long since standardized on Lapp Line Posts.

There isn't anything we were saying about Lapp Line Posts twenty years ago that we haven't been saying since, and aren't saying today . . . *except* that . . . *the unsupported claims of 1931 are accomplishment proved by the record in 1951.* And that, in hundreds upon hundreds of long-service installations, the record proves that *lines on Lapp Line Posts have fewer outages, require fewer insulator replacements and less maintenance than comparable lines on any other type of insulator.*

You, too, will have fewer service interruptions . . . you'll save on manpower . . . you'll reduce maintenance costs . . . when you write into your transmission line standards and specifications "*Lapp Line Posts.*"

Lapp

LAPP INSULATOR CO., INC., LE ROY, N.Y., U.S.A.

Vaportight Lighting Fixtures

(5) Appleton Electric Co., 1701-59 Wellington Ave., Chicago 13, Ill.

Fast installation and safer, simpler maintenance are claimed for a new line of convertible vaportight lighting fixtures for mounting on rigid conduit. Designated V-51 series, the line has complete interchangeability of parts.

It includes 18 types of malleable iron fixture bodies for pendant, ceiling or bracket mounting. All of these bodies are threaded to take both the 100-w or 150-200-w lamp receptacle-globe-guard assemblies now offered. All bodies except bracket types are grooved to mount 100-, 150- or 200-w reflectors in a choice of four styles—standard dome, shallow dome, deep bowl or 30° angle.

Reflectors are steel with green baked porcelain enamel outside, white enamel inside. Receptacle assemblies and snap-on type guards are aluminum. Navy standard vaportight globes are available in clear glass, colors or heat-resisting types.

Unit assembly construction provides wireless spring leaf electrical contact between the fixture body and lamp receptacle, permitting receptacle with lamp, globe and guard to be unscrewed as a single unit without tools for relamping or cleaning.

Control Centers

(6) Ward Leonard Electric Co., Mount Vernon, N. Y.

Applying the building block principle to motor control, Multitrol control centers are designed for accommodating any control system up to 600 v, using components not larger than NEMA size 5. Primary applications are for refrigeration and air conditioning, industrial plant machinery, generating plant auxiliaries and similar installations where a group of motors can be independently or interdependently controlled from a central location.

Prefabricated units containing control for a single motor are assembled and wired into a free standing steel enclosure section. Any number of sections may then be bolted and bused together to form a Multitrol control center.

Built to AIEE and NEMA standards, Multitrol is available with magnetic full-voltage starters, reversing or non-reversing; multi-speed starters; primary or secondary resistance starters and autotransformer starters. Standard starters have externally operated circuit breakers, thermal overload protection and low-voltage protection. Construction feature include: two standard-size sections 76 or 90 in. high, 20 in. wide and 20 in. deep; standardized buses; simplified wiring and installation; local or remote control. Available as NEMA type A, B and C control centers.

For Additional Information
Fill in the Coupon on Page 57

Encased Precipitron

(7) Westinghouse Electric Corp., Sturtevant Division, 200 Readville St., Hyde Park, Boston 36, Mass.

An encased Precipitron electronic air cleaner now available resembles a factory-fabricated section of air duct or plenum chamber 96 in. long with a built-in Precipitron. The PE units are available in air cleaning capacities ranging from 8,330 cfm at 90% efficiency to 44,000 cfm at 85% efficiency. Efficiencies are measured by U. S. Bureau of Standards Blackness Test Method. A 90% efficiency results when air velocity is 333 fpm. When the velocity is increased to 400 fpm (up 20%) the efficiency drops to 85% (5.5%).

Over-all cross-sectional dimensions range from 5 ft 4 11/16 in. high by 5 ft, 2½ in. wide for the 8,330-cfm unit to 10 ft, 4 11/16 in. high by 11 ft, 1¾ in. wide for the 44,000-cfm unit. All are 8 ft long. Approximate net weight is from 1,970 lb for the smallest unit to 4,800 lb for the largest. The units are shipped disassembled because of size and weight.

Weatherproof Lamp

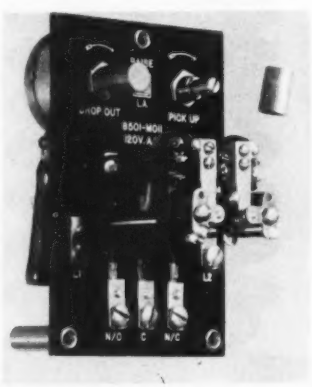
(8) Oscar Phillips Co., 4632 Paddock Rd., Cincinnati 29, Ohio

A weatherproof horizontal-type light has been added to the manufacturer's line. It is installed on 2-in. pipe 8 ft or higher above ground, depending on requirements. A bracket is supplied for attaching the support pipe. The manufacturer also manufactures exterior fluorescent fixtures of the vertical post type; half round type for wall or post mounting.

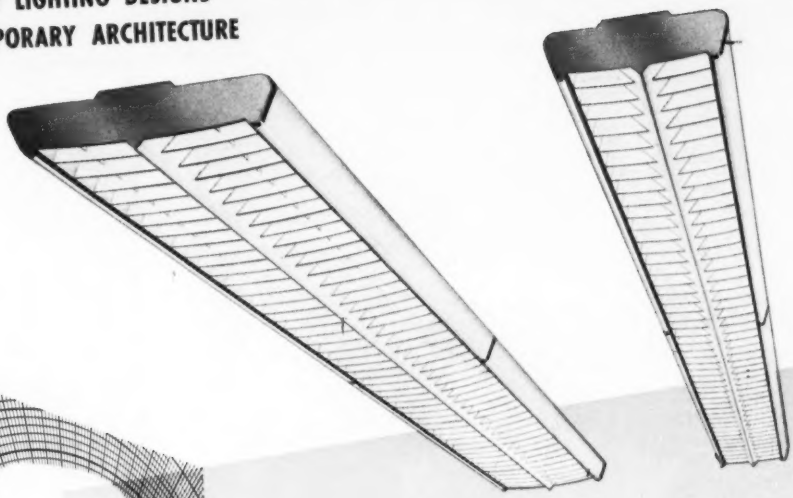
Voltage Sensitive Relay

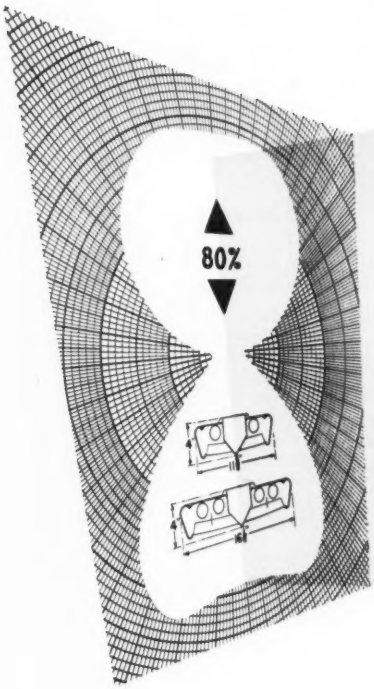
(9) Square D Co., 4335 Valley Blvd., Los Angeles 32, Calif.

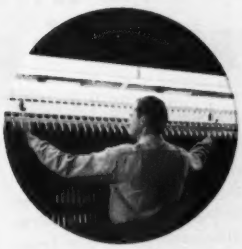
Sensitive response to impressed voltage is provided by the Class 8501 type MO11 voltage sensitive relay, according to its manufacturer. It may be used for a variety of under- or over-voltage operations and its rugged construction is claimed to insure positive action. Its single-pole double-throw contact arrangement makes it especially adaptable as a pilot device for indication or to actuate transfer contactors, the manufacturer states. Although basically designed for 110-v a-c service, it can be supplied for a-c voltages up to 440 v as well as for 115-v direct-current service.



CONTEMPORARY LIGHTING DESIGNS for CONTEMPORARY ARCHITECTURE



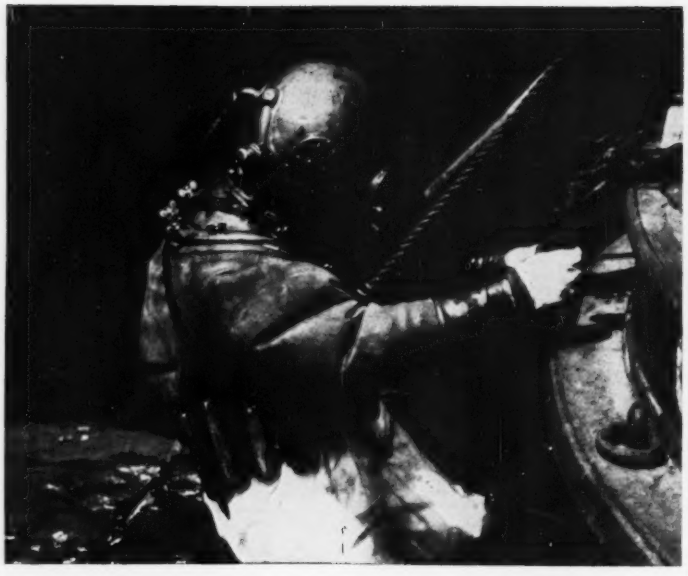




A new Sunbeam series (#L-1280) combining simplicity of line and structure with an accent on easy maintenance. • Only four inches deep, these new units have been designed to meet the needs of contemporary architecture, for a high output, non-recessed light source that is visually unobtrusive yet has high distribution efficiency. • A one-piece, easily displaceable louver shielding element which exposes lamps (and wiring if desired) for immediate inspection, is the key to the reduction of high maintenance costs, generally found in today's large area lighting installations. • Available for immediate delivery, this new series will be specified for stores and offices everywhere. Watch for it. For complete details write...

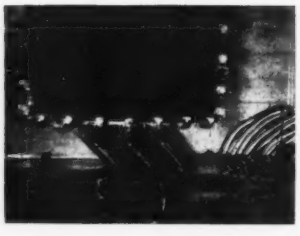
SUNBEAM LIGHTING COMPANY

777 EAST 14TH PLACE, LOS ANGELES 21, CALIFORNIA



Undersea wiring failures stopped with plastic tape!

Proof that plastic tape protects ➡



In the installation shown at right, transition splices between lead and rubber covered cables, subjected to corrosive action of salt water in a manhole below high-tide level, are still in perfect condition. This tough job at San Francisco Naval Shipyard is completely protected by watertight splices made exclusively with "SCOTCH" No. 33 plastic and No. 24 Neoprene Electrical Tape and "3M" Adhesive No. EC-847. Cables have been in service more than 18 months and show no signs of deterioration.

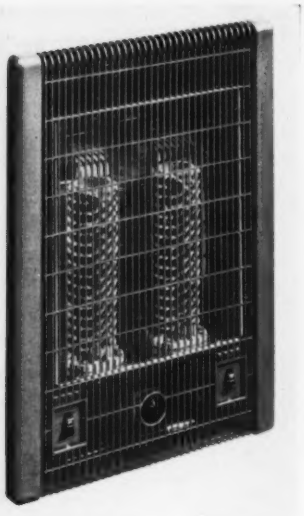
Whatever your insulating problem, one of the many "SCOTCH" Brand Electrical Tapes can help you. They are easy to apply. Seal snugly around odd shapes and uneven surfaces. Write Dept. EW551 for full information.

QUICK FACTS ABOUT "SCOTCH" No. 33 Electrical Tape

- **TOUGH PLASTIC**—is abrasion resistant, unaffected by water, oil, alkalies, alcohols, sunlight.
- **HIGH DIELECTRIC**—10,000 volts.
- **THIN CALIPER**—only .007 inch thick.
- **STRETCHY**—moulds to any surface.
- **NON-CORROSIVE**—contains no sulphur-bearing compounds.
- **P. S.**—for permanent high-heat insulation try "SCOTCH" Electrical Tape No. 27 with glass-cloth backing, thermo-setting adhesive.

SCOTCH BRAND Electrical Tape No. 33

The term "SCOTCH" and the plaid design are registered trade marks for the more than 100 adhesive tapes made in U. S. A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: Minn. Mining & Mfg. Co., International Division, 270 Park Avenue, New York 17, N.Y.



New Heater Line

(10) Wesix Electric Heater Co., Room 315, 390 First St., San Francisco 5, Calif.

This new wall furnace line replaces the manufacturer's FSE line of flush wall automatic electric heaters. Lines are vertical to match modern home design. Air flow has been increased to allow even, normal circulation without turbulence, according to the announcement. The built-in thermostat is located in the center of the incoming air stream to give accurate and sensitive temperature regulation.

(11) **CLOSET LIGHT**—A combination light and door switch is mounted on the door jamb; can be wired in from an existing closet light outlet. The light goes on when door is opened, off when it is closed. Comes in white and brown bakelite, is available with pull chain, if desired. Underwriters' approved. Made by Union Insulating Co., Parkersburg, W. Va.

(12) **CANDLE**—An electrified candle is offered by the North American Electric Lamp Co., 1014 Tyler St., St. Louis, Mo. It is constructed of seamless aluminum and is finished in white enamel; measures 5¾ in. long and is 1½ in. in diameter. A 2½-v candle flame lamp and two heavy-duty batteries are supplied.

(13) **VIDEO AMPLIFIER**—Designed for complex wave form inspection in connection with an oscilloscope, this unit has a gain of 1,000; frequency response is flat from 15 cps to 4 mc within 1.5 db of the 10-kc response point. A cathode follower input stage is used for circuit isolation and includes an input attenuator providing 1:1, 1:10 and 1:100 attenuation ratios as indicated by a control knob on the front panel. The input impedance, without probe, is approximately 2.2 megohms and 40 mmfd on all attenuator ranges. Riply Co. Inc., Middletown, Conn.

The ADVANCED DESIGN FEATURES of the

KEARNEY Type "T" TRIP-OUT

200 AMPERE

Assures You of

Better Protection

of Equipment on Lines
Up to 15,000 Volts

Here's why—

- Silver to silver contacts for heavy loads
- High conductivity copper current path through switch
- Floating top contact to assure proper contact alignment
- Fuse cartridge opens at both ends—assures rapid expulsion of arcing gases and high interrupting capacity
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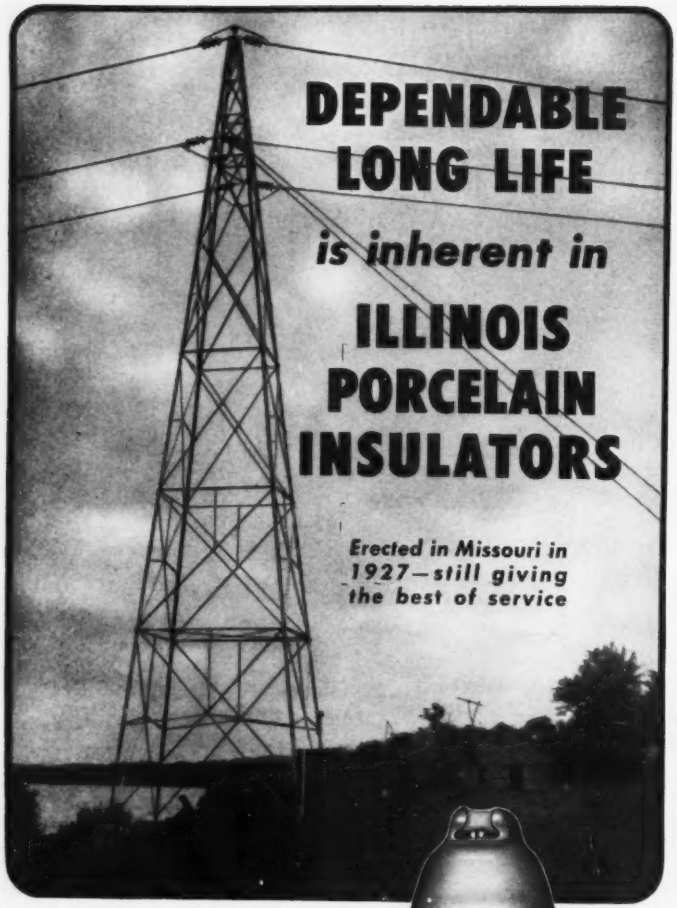

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Produced to Illinois' exacting electrical and mechanical standards—completely tested and inspected to insure against breakdown on the job. This, plus a proved record in countless installations like the one pictured above give complete assurance of long years of thoroughly dependable service.

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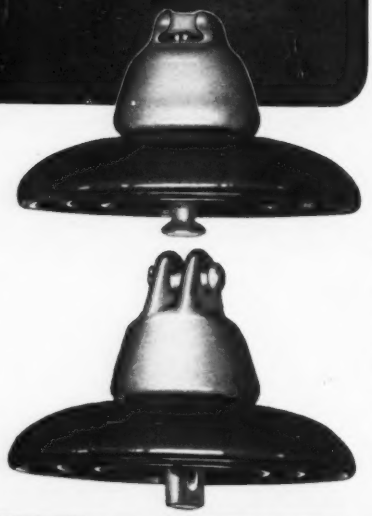

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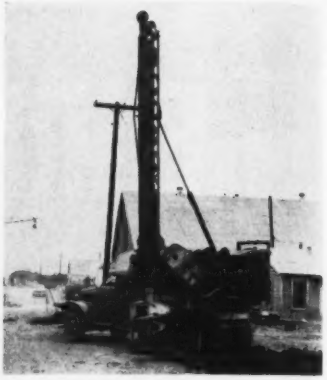


Newly Designed Hole Diggers

(14) Hugh B. Williams Mfg. Co. Distributed by Joslyn Southwest Co., 5100 District Blvd., Los Angeles; 180 Potrero St., San Francisco

Newly designed models of the Williams hole digger are for heavy-duty steel tower and transmission line work in hard materials. According to the manufacturer, their performance with 4- and 5-ft augers is equivalent to rigs built previously with augers 24 in. in diameter.

One of the new units comes with a turntable that allows the operator to rotate it completely around the rear end of the truck and, at any point, to extend and retract it over a distance of approximately 2 ft. The other provides for rotation across the rear of truck approximately 4 ft either side of center and for retraction horizontally over a distance of 2 ft. Adjustments may be made to drill vertical holes regardless of truck position.

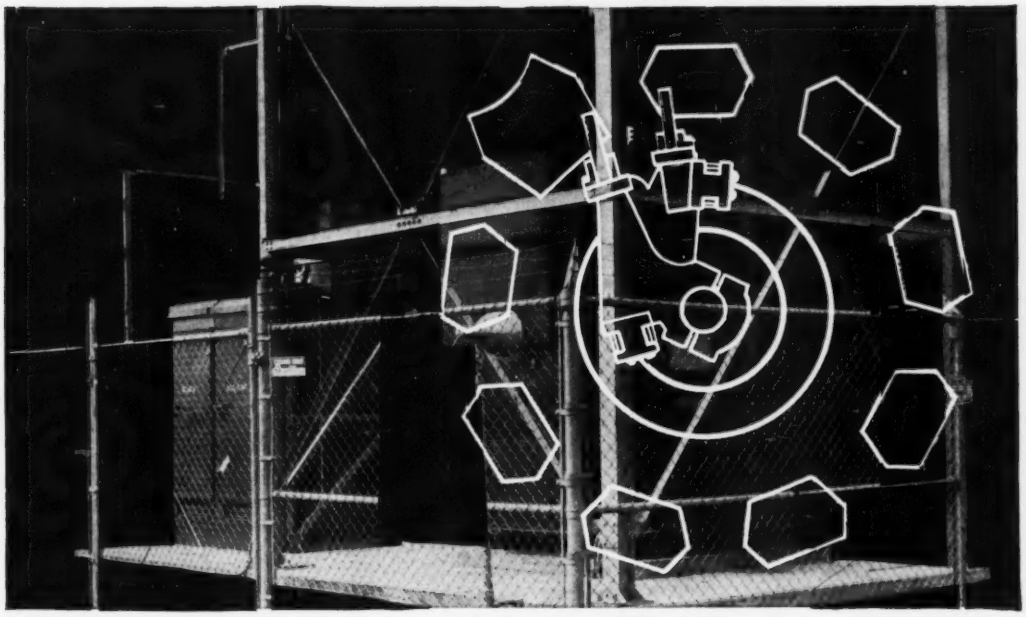
The machines may be equipped with pole-setting devices (built on the truck and operating in conjunction with the digger) that will set multiple-pole transmission line structures.

Units are available mounted on crawler-type tractors of any manufacture so long as proper power take-off equipment is supplied and the tractor alone grosses approximately 12,000 lb. One man can carry and install a size 2 starter without a truck or chain hoist.

(15) **STARTERS**—A new line of Explo-Safe and weatherproof magnetic starters has been introduced by the Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn. They are available in sizes 0, 1, 2, 3 and 4 for a variety of uses. Featured is a compact and rugged Feraloy cast housing in combination with the RA (right angle) type of mechanism. According to the manufacturer, this unit is smaller and weighs less than former models.

ELIMINATE ALL ARCING

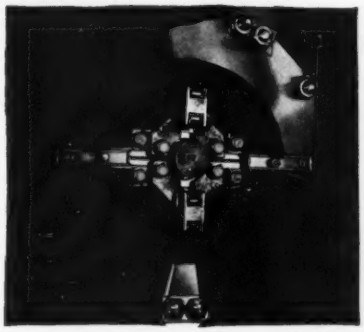
ON TAP SELECTOR SWITCH CONTACTS WITH . . .



. . . MOLONEY LOAD TAP CHANGERS PROVIDED ON FEEDER VOLTAGE REGULATORS, REGULATING TRANSFORMERS, LOAD RATIO CONTROL TRANSFORMERS

All Moloney Feeder Voltage Regulators, Regulating Transformers and Load Ratio Control Transformers are provided with Load Tap Changers which feature a load transfer switch to relieve the tap selector switch of all arcing duties. The load transfer switch has only four stationary contact tips per phase as compared with eighteen on the tap selector switch. This arrangement not only reduces the number of contacts subject to arc erosion, but also permits longer arc clearances to assure positive break of the arc. Liberal clearances of current carrying parts result in maximum capacity of the regulating equipment with minimum physical size. The load transfer switch, which is the only switch required to transfer load current, is provided with accelerating springs and is driven by Geneva gears. This assures quick break of the arc.

This is but one of the many features of the Moloney Load Tap Changer. This same sound basic construction is found in the regulating apparatus on which the tap changer is used.



Liberal clearances prevent establishment of an arc between adjacent current carrying contacts of the load transfer switch. Special alloy arcing tips prevent damage to the switch contacts as they are opened or closed.

M331-10

MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

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Low Cost ... High Wattage

RADIANT Wall-Insert HEETAIRES...

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OR MANUAL CONTROL

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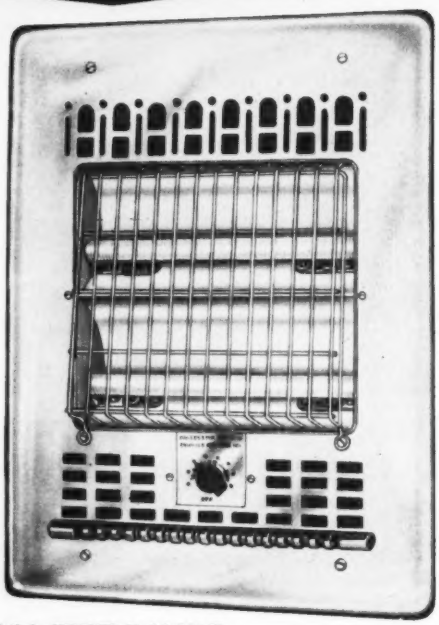

Built-In HEETAIRE Model 248 TE

NOW ... Automatic Thermostatic Control has been added to this low cost series of Wall-Insert Heetaires. Just set the thermostatic control dial at the temperature you want—the Heetaire will automatically produce and maintain any desired temperature between 40° and 80° F. ! It is economical — the built-in thermostat automatically turns the Heetaire on and off as needed — not using unneeded electrical current.

It is *small* and *compact* — Simply and Easily Installed ! 1500 Watts . . . also available in 1000 and 1250 Watts . . . 120 or 240 Volts . . . ONLY 17⅜" high x 12⅝" wide !

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ELECTRIC PRODUCTS, INC. PRODUCTS, INC.
148 SENECA ST. BUFFALO 3, N. Y.

Mining Motors

(16) General Electric Co., Schenectady 5, N.Y.

A new line of explosion-proof mining motors, conforming to the Bureau of Mines schedule 2E, is available in ratings from ½ through 60 hp at 230, 250, 500 and 550 v, with stabilized shunt, compound or series windings.

All frame sizes utilize two stud brush mechanisms and all brushes are accessible through two large handhole covers in the upper half of the commutator end shield.

Standard motors are foot mounted, but modifications can be supplied less the feet for strap mounting, or with a face or flange end shield.

Junction Boxes

(17) Stone Mfg. Co., Elizabeth 4, N.J.

New heavy-duty weatherproof junction boxes are made of non-corrosive cast aluminum; include a variety of covers and fittings for use on outdoor wiring or lighting jobs. The box has four hubs tapped ½ in. IPS; comes with or without mounting lugs; has a flat aluminum cover plate sealed with a heavy cork gasket and a separate cast aluminum cover tapped ½ in. IPS to take standard lamp holders for the 150-, 200- and 300-w outdoor weatherproof reflector bulbs.

(18) **FITTING**—The Gedney Nest Back is a supplementary spacer that fits snugly under the clamp back when conduit is installed by the conventional malleable iron pipe strap and clamp back method. It permits additional spacing away from the mounting surface. Since the Nest Backs fit securely into each other, conduit can be installed at any desired distance from walls or ceilings, according to the manufacturer, Gedney Electric Co., RKO Bldg., New York City, N. Y. They are made of malleable iron, hot dip galvanized; come in a full range of sizes for rigid conduit and EMT.

(19) **DEVICES** — An adjustable hung-ceiling bar hanger comes with a snap-on stud and end straps. Installation requires three steps: bar hanger is extended to proper width, is laid on top of the channels and end straps are wrapped around each channel. After stud is positioned, the box is snapped on. Product of Fast Lok Mfg. Co., Bridgeport 5, Conn.

(20) **REGULATOR**—A single-step voltage regulator is announced by the Rural Transformer & Equipment Co., 632 N. 8th St., Milwaukee 3, Wis. It is pole mounted, OISC, 20 amp normal, 40 amp for 4-hour peak. On 7,200 and 7,620-v, 60-cycle grounded systems, it will regulate 300 kva, single phase, according to manufacturer.

(21) **BREAKER** — The type AB breaker with an improved motor-operated mechanism for applications protecting critical electronic circuits is available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

YOUR COMPLETE NEW CATALOG OF

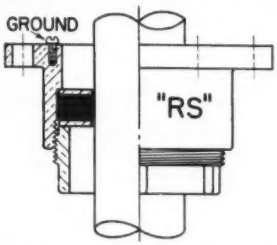
G&W POTHEADS

Complete listings make this bulletin a must for your desk. Keep it handy for easy reference to all ratings and shapes of G&W Potheads and related information.

LISTING FOR THE FIRST TIME

NEW *UNIVERSAL* ENTRANCE

FOR ALL TYPES OF CABLE



TYPE "RS" RESISTOYL ENTRANCE SEAL

Stuffing box with "Resistoyl" gaskets makes water, oil, and compound-tight seal on any cable sheath. Easily installed fittings furnished for conduit, armor, and wire armor.

- **Capnut Terminal Potheads**
- **Disconnecting Potheads**
- **Straight Through Potheads**
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- **New Shape "CL" 45° Angle Bodies**
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- **Insulating Compound**
- **Installation Instructions**
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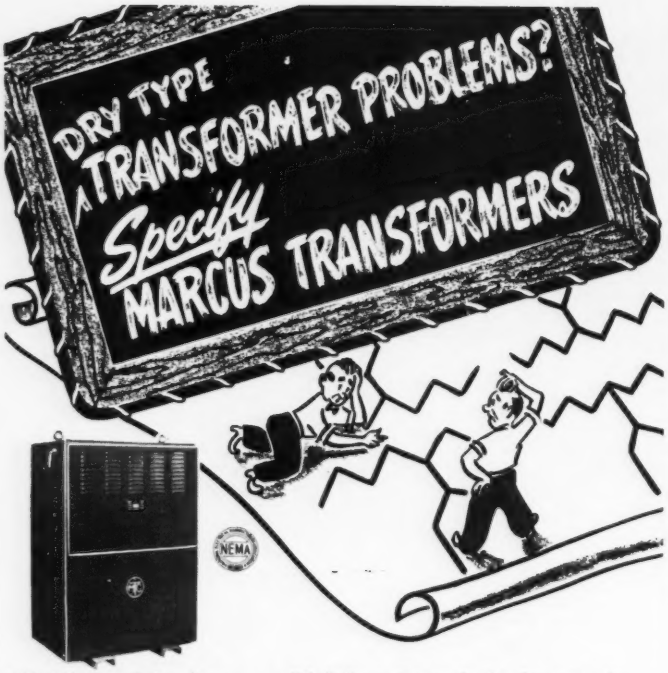

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450 KVA, Type F Unit Substation, 4160 V. Delta, 60 Cycles, 3 Ø—120/208Y, 4 wire.

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- SPECIAL

Made by a pioneer in the dry type, air-cooled transformer field. Eliminate need for liquid filled units. No hazardous, inflammable oil or toxic liquid to fuss with. Maintenance of oil level, foreign matter, sludge accumulation, and subsequent filtering are relegated to the "horse and buggy days".

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PIONEERS IN THE FIELD OF AIR-COOLED TRANSFORMERS

Grounded Receptacle

(22) Wiremold Co., Hartford 10, Conn.

A 2127G NEMA grounded receptacle for parallel blade plug cap or the new NEMA standard grounding plug is rated at 15 amp, 125 v; has double-wipe contacts. It has the same dimensions as the 2127 receptacle, permitting replacement of exisiting 2100 Wiremold installations using the 2127 undergrounded receptacle with the new accepted standard. Capacity of the 2100 Wiremold with 2127G installed is 6 No. 12 conductors.

New Bonder

(23) General Electric Co., Chemical Dept., Pittsfield, Mass.

A new chemical development is claimed to permit a bond between silicone rubber and metals, glass or ceramics that is stronger than the rubber itself. Designated as G-E 81267 primer, it is a thin, light-colored liquid. Sheer strength measurements of bonds on steel are said to be approximately 700 lb. per sq in. Application technique is simple, according to the manufacturer.

Burglar Alarm

(24) Photoswitch Inc., 77 Broadway, Cambridge 42, Mass.

Photoelectric intrusion alarm set PIA is said to give a protecting wall of invisible light across any space up to 50 ft. It consists of a photoelectric control type A20C-2 and light source type L 60B. An invisible infrared beam is projected from the light source spanning any distance up to 50 ft. This is aligned to strike the "eye" of the control. Momentary interruption of the infrared beam actuates the control relay, which is wired to operate and sustain an external alarm device. Alarm can be silenced only by restoring the electrical circuit to original conditions by use of a manual or automatic reset switch.

(25) **METER**—An all-purpose meter for measuring moisture content of lumber, wood, plaster and other materials of varying textures and consistencies has been introduced by TAGliabue Instruments division of Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J. Known as TAG Moisturonic moisture meter model 8008, the portable instrument has an over-all range of from 2,000 ohms to 20,000 megohms.

(26) **MOTORS**—Reversible motors that can be used as single-phase shaded pole induction motors, as single-phase capacitor motors or as 2-phase motors are available from Barber-Colman Co., Small Motors Dept., Rockford, Ill. The shading coil circuits of these motors can be designed for impedance, or transformer, coupling to the plate circuit of various radio tubes.

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Switch to
LOCKE SWITCH & BUS INSULATORS
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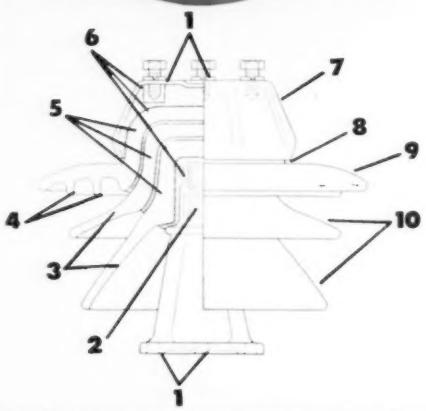

LOCKE DESIGN gives you ALL these advantages

1. Precision assembly jigs maintain positive alignment between tapped holes in the cap and bolt holes in the pin (or base). The top of the cap and bottom of the pin are parallel to within .015-inches. Such accuracy means easy assembly of switches or other apparatus mounted on them.

2. Vertical ribs on the inside of the caps and the outside of the pins provide high torsional strengths.

3. The Locke wet-process porcelain body—the toughest known—has been a standard of comparison since 1893. It is fully capable of withstanding power arcs, lightning flashovers and extremely rough handling.

4. The contours of the corrugations are such as to give maximum resistance to mechanical impact consistent with total weight and balanced electrical characteristics. The depth of the corrugations assure full leakage distance.

5. Locke Compression Sand at the cement joints adds to strength, and the stability of that strength, throughout the life of the insulator.

6. Non-hardening, resilient coatings, applied to all unsanded, load-carrying surfaces, distribute loading efficiently and act as expansion joints under temperature changes. This contributes to longer life.

7. Galvanizing is done by the exclusive Locke Permazinc process—a quality-controlled, double hot-dip method that assures the highest degree of resistance to weathering and corrosion.

8. In assembly the lower edge of the cap is held positively away from the porcelain. This provides an expansion joint which prevents thermal changes from causing high internal stresses in the insulator.

9. Compression Glaze—a Locke development—assures high resistance to damage from thermal shock or mechanical impact. This means that Locke insulators can be handled faster in construction without danger of chipping or breaking.

10. The uniformly smooth glazed surface assures easy natural cleaning by wind and rain, and aids the insulator in maintaining its originally excellent electrical characteristics.

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SUSPENSION INSULATORS

SWITCH & BUS INSULATORS

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GUY INSULATORS

LIQUID-FILLED BUSHINGS

SUSPENSION & STRAIN CLAMPS

SUSPENSION HARDWARE

ENTRANCE BUSHINGS

BULLETINS ETC.

(27) GENERATORS and MOTORS—A new 32-page bulletin, 05B7549, "Hydraulic Turbine Driven Synchronous Generators and Large Vertical Motors," is the second in a series released by Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis. Suspended and umbrella types of vertical generators are compared and large horizontal generators are described; tools and accessories are listed. Illustrations and charts bring out special details of both types. One section covers large vertical motors, and the motor-generator unit that has a dual use.

(28) POTHEADS—This 72-page catalog, AB51, supersedes Bulletins 147 and 392 previously issued by G & W Electric Specialty Co., 7780 Dante Ave., Chicago 19, Ill. A complete listing of all capnut, disconnecting and straight-through potheads, pothead parts and directions for installation are included. Single-conductor potheads and 16 standard shapes of multiple-conductor potheads are given in ratings from 600 to 34,500 v. A rubber bushing stuffing box for leaded and non-leaded cables, developed by G & W, is listed for the first time in this bulletin.

(29) LIGHTING—"Planned Lighting for Industry" covers lighting problems for industry gearing for defense production. Benefits of good lighting, and the engineering of such lighting are explained. Sections of the publication are devoted to protective lighting, wiring and maintaining lighting systems, and lighting of service areas, offices and drafting rooms. Bulletin LD-4, a 47-page booklet, is a release of General Electric's Lamp department, Nela Park, Cleveland 12, Ohio.

(30) GEARS — An illustrated explanation of Micarta gears is offered to equipment manufacturers in a 15-page bulletin from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Booklet B-4661 contains application rules for these gears; and physical properties, preferred pitch and gear-data tables. Horsepower-rating formulas are illustrated and applications of Micarta gears are shown.

(31) WEDGES—Two bulletins have been issued by Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago 6, Ill. A 4-page folder covers Inmanco brand of wood wedges in standard sizes and shapes and lists many special shapes and sizes that can be produced. A 2-page bulletin lists specifications of Inmanco standard fiber wedges.

(32) ELECTRONIC COMPONENTS — The new Stackpole RC-8 Electronic Components 42-page catalog offers many new items in addition to the standard lines of fixed and variable resistors, line and slide switches, iron cores, choke forms and "gimmick" capacitors. Engineering data and complete specifications are included. It may be obtained from the Electronic Components Division, Stackpole Carbon Co., St. Marys, Pa.

(33) FIRE BRICK—Johns-Manville, 22 E. 40th St., New York 16, N. Y., is offering a 4-page illustrated folder entitled "JM-3000 Insulating Fire Brick" describing the use of these insulating fire bricks for sustained use at 3,000° F. Accessory materials and other insulating brick are included in summarized form.

(34) RESISTORS — Information and specifications of standard wire wound resistors and accessories may be obtained in Bulletin No. 176 released by Wirt Co., Philadelphia, Pa. Several methods of protectively coating the wire are described; photographs and sketches illustrate features.

(Continued on Page 58)

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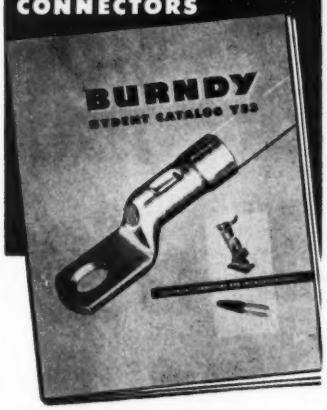
Important facts about BURNDY INDENT-TYPE CONNECTORS



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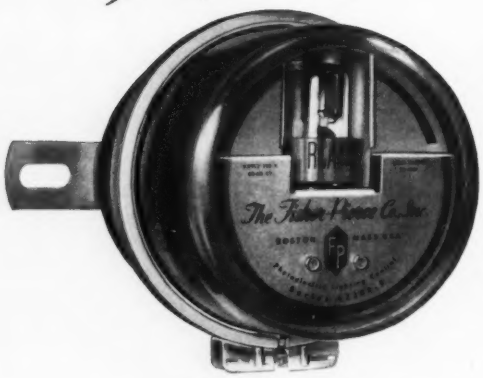

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FISHER-PIERCE

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FOR STREET LIGHTING

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The new 63300 B Control is mechanically and electrically interchangeable with existing controls. The same dependable Fisher-Pierce circuit, consistently giving tube life of more than 20,000 hours, has been retained. Improved spacing and insulation provides increased protection against lightning damage . . . up to 2500 volts rms Hipot. Mechanical design has been altered to provide maximum simplicity for greater economy of servicing.

The FISHER-PIERCE Co., Inc.

43 CEYLON STREET, BOSTON 21, MASS.

(35) SWITCHES—Small Units have been added to the Micro Switch line of Freeport, Ill., as shown in "Uses Unlimited" Vol. 7, No. 1. Practical applications of the switch units control are also explained and illustrated.

(36) MOTORS—Large induction motors is the subject of a 28-page booklet, B-4739, released by Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa. Types CSF and CWF motors, stators and rotors are summarized and applications are illustrated for industries using such motors.

(37) MOLDING POWDERS—Complete information on all G-E plastics molding powders is given in "G-E Thermosetting Molding Powders." The 34-page booklet is pocket-sized, explains the wide variety of grades and gives powder and molded properties. CDC-195 is available from the Chemical Department, General Electric Co., Pittsfield, Mass.

(38) CHROME PLATING — Bulletin IC-20 describes the new Chromaster Model A-20 industrial hard chrome plating unit being featured by Ward Leonard Electric Co., Industrial Chrome Division, Mt. Vernon, N. Y.

(39) 4-H PROGRAM—A guide for power supplier cooperation in the 4-H Farm and Home Electric Program for the club year has been prepared by the School Service, Dept. T, Westinghouse Electric Corp., Box 1017, Pittsburgh 30, Pa. The 4-page leaflet outlines ways in which power suppliers can work with 4-H leaders in the execution of their program.

(40) CONNECTORS—A 24-page catalog (Y53) of Hydent electrical connectors and installation tools has been published by Burndy Engineering Co., New York 54, N. Y. It also gives instructions for selecting connectors and tools.

(41) SWITCHES—Catalog 114.1 from Pacific Electric Mfg. Corp., 5815 3rd St., San Francisco 24, Calif., describes types SW and SWA outdoor air switches, 66-S kv, 600 amp., with solid-silver rolling contacts.

(42) GUIDE—Day-Brite Lighting Inc., St. Louis 7, Mo., has published a "Complete Illustrated Buyers Guide," No. 60-U-2, which supersedes 60-U-1.

(43) SOUND FILMS—Seventy-two sound films, available for loan to organized groups, are listed in catalog B-4761, Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. These films cover general interest subjects, production courses.

(44) PLUGS — Cannon Electrical Development Co., 3209 Humboldt St. Los Angeles 31, is offering a 4-page bulletin on its new line of RS hermetically sealed plugs for aircraft relays and other sealed components.

(45) LIGHTING FIXTURES — Markel Electric Products Inc., Buffalo, N. Y. has issued its new catalog.

(46) AMMETERS—Tong test ammeters are the subject of an 8-page bulletin from Columbia Electric Mfg. Co., 4519 Hamilton Ave., Cleveland 14, Ohio.

(47) MOISTURE METER — A 4-page bulletin, 1263, describes an improved dielectric moisture meter. Available from TAGliabue Instruments Division, Dept. 67, Weston Electrical Instrument Corp., 614 Frelyinghuysen Ave., Newark 5, N. J.

(48) MOLDING COMPOUND — Properties and uses of molded Plaskon Alkyd are covered in bulletin A-7 from Plaskon Division, Libbey-Owens-Ford Glass Co., Toledo 6, Ohio.

Final electrical tests prove the soundness and adherence to specification of these large new Pennsylvania Transformers. According to the manufacturer, a few of the specific facts relating to this equipment are . . . "Rating, 6,000 kva, 3-phase, 60-cycle, 55 degree C. temperature rise, with provisions for fan cooling to increase capacity to 8,000 kva. High voltage, 110 kv (Delta); secondary, 34.5 kv (Y). Tank radiators are shipped separately and installed at erection site. Horizontal reenforcing rings act as bracing for 15-pound tank pressure and full vacuum. These rings also provide additional gas space for the pressure type nitrogen system of oil preservation. Pennsylvania's new improved structural steel base, as shown, facilitates jacking, moving, and painting and was developed after an extensive study of field requirements. In addition to these features, long trouble-free operation is further asssured by . . ."

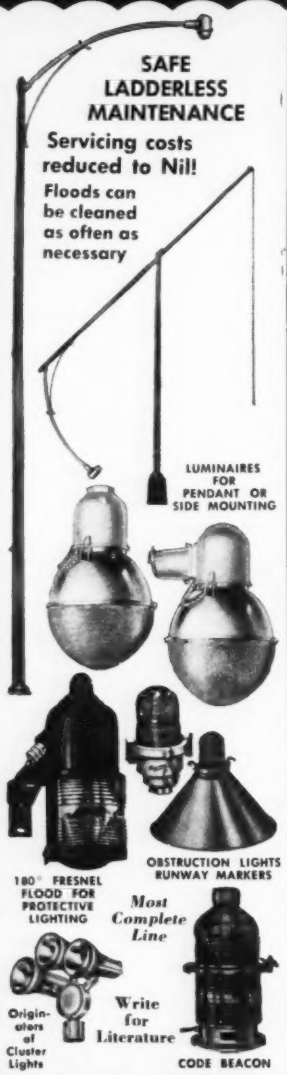
BUSHINGS ONE OF THE FINEST COMPONENTS OF *ANY* TRANSFORMER . . . . . .

Ohio Brass

MANSFIELD, OHIO

413-41

The HOTTEST Item in STREET LIGHTING-
Revere
ELECTRIC MFG CO. CHICAGO
HINGED STANDARDS



REVERE ELECTRIC MFG. CO.
6016 BROADWAY, CHICAGO 40, ILL.
STOCKED BY L. M. BAXTER & CO.
SAN FRANCISCO—SEATTLE—PORTLAND
LOS ANGELES: BRACKEN SALES AGENCY

LETTERS TO THE EDITOR

To the Editor:

Reference is made to the article "Low Cost Underground in Hawaii" in the January 1951 issue of ELECTRICAL WEST.

I am a foreman for a utility company and have had direct supervision of installation of underground construction and maintenance.

About 20 years ago I installed our first suburban low-cost underground system which is almost identical with the Hawaiian installation. Since then numerous similar installations have been made. From my observations, I believe the following practices are mistakes:

1. Direct burial cable. Despite the depth the cables are laid, they are mechanically damaged by post hole diggers, tree plantings and subsequent trenching. As future developments involve building of fences, planting of gardens and shrubs, erection of garages, doghouses, chickenhouses, etc., it is invariably found that these are over the cable routing. Failure of a cable in any of these areas involves long outages. Quite often the added expense of temporary overhead to give service until the trouble can be located and permanent repairs made is a big factor.

If runs are straight, a direct burial nonmetallic conduit is preferred. If any bends are necessary other than at the extreme ends, they should be metal with about five feet of metal extended from each end of the bend. Street crossings should all be metallic from curb to curb. While duct will not give 100% protection, it will in most cases stop diggers before damage to the cable occurs and interruption of service has resulted. Moreover, for any cause of failure or replacement of the original cables, they are easily withdrawn and new cable pulled in where a duct system is used.

2. I believe that all 4-kv or higher voltage cable should be of the shielded type. After installation the dielectric stresses on the cable are unequal along its length. There has been no doubt of some failures in nonshielded cable because of ozone attack and deterioration of the insulation at points of unequal dielectric stress. Gophers as well as insects in some areas have a peculiar appetite for the cable insulation. Duct will keep the larger rodents out and shielding, no doubt, would stop the insects.

3. I do not believe that precast boxes are a saving. I prefer casting the boxes in position. Precast boxes are never the right depth and in setting them on disturbed ground they invariably settle. As a result, in the course of a year or two, they are sunken or badly tilted. A ¼-in. steel checker plate cover, screwed down is also preferred to a cast concrete cover. Concrete covers are heavy and hard for one man to lift and if not handled carefully or set evenly they invariably become badly cracked and broken. If of the type that rest in a recess, the recess fills with loose dirt and it becomes difficult to remove the cover without breaking the edges of the box or cover in prying open the box.

4. Transformers should always be located near street intersections—not in the rear of lots at the middle of a block. Rear of lot transformer locations are hard to get to in the event of replacement after the usual improvements in these subdivisions have been made. Such locations also are often embarrassing to a trouble man trying to locate a blown fuse in the middle of a night with a yard full of bulldogs or an irate resident with a six-shooter questioning the "prowler" in his back yard at such hours.

There is much argument pro and con for low-cost underground. The time may come when overhead will be completely displaced in all except rural areas. Therefore, it is important now that we find the cheapest satisfactory type of underground construction that can be developed. However, direct burial and the cheaper cable for low initial cost is not the answer, in the opinion of the writer.

Use this coupon if: (1) you have a problem; (2) want to ask a question; (3) want to comment on any department in the magazine; (4) have a "gripe."

Dear Editor:

NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

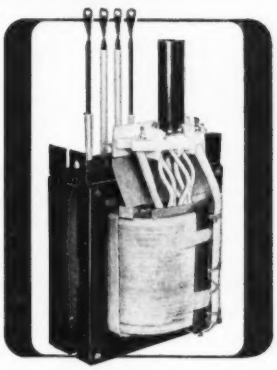
CITY ..... STATE .....

Form W

New Shur-Seal cover prevents oil contamination

Wagner Form W Transformers are now provided with the exclusive Wagner SHUR-SEAL Cover . . . a *positive* seal that completely prevents oil contamination caused by injurious "breathing" of atmospheric air, moisture and dust particles during the daily load cycle.

The SHUR-SEAL Clamping ring maintains uniform pressure *around the entire periphery of the cover* to assure sealed-tank construction, airtight as a welded tank, but permits removal of cover, if necessary, by loosening a *single* stainless steel bolt.



The Form W core is made of cold rolled oriented grain transformer steel, carefully heat treated to obtain the lowest practical magnetic losses. The preformed core is assembled in a shape that provides a path for the magnetic flux parallel to the grain of the steel.

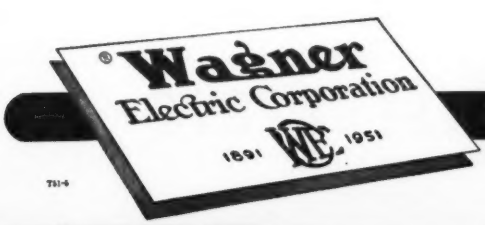
Form W

Means small size, light weight, excellent performance

Wagner Form W Transformers are exactly right for modern distribution systems. They are liberally designed—yet small in size and light in weight to permit greater ease of handling, storing, and mounting on poles.

Electrical performance is excellent—core and copper losses are relatively low . . . regulation at both 100% and 80% PF is good . . . exciting current is extremely low . . . short time overload capacity is high. Form W gives the type of service that you need.

Investigate Wagner Form W Transformers today.



WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave., St. Louis 14, Mo., U.S.A.

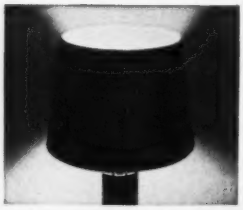
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

751-4

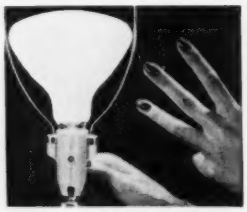
NEW G-E INDIRECT 3-LITE BULB

. . . provides far better light in table lamps

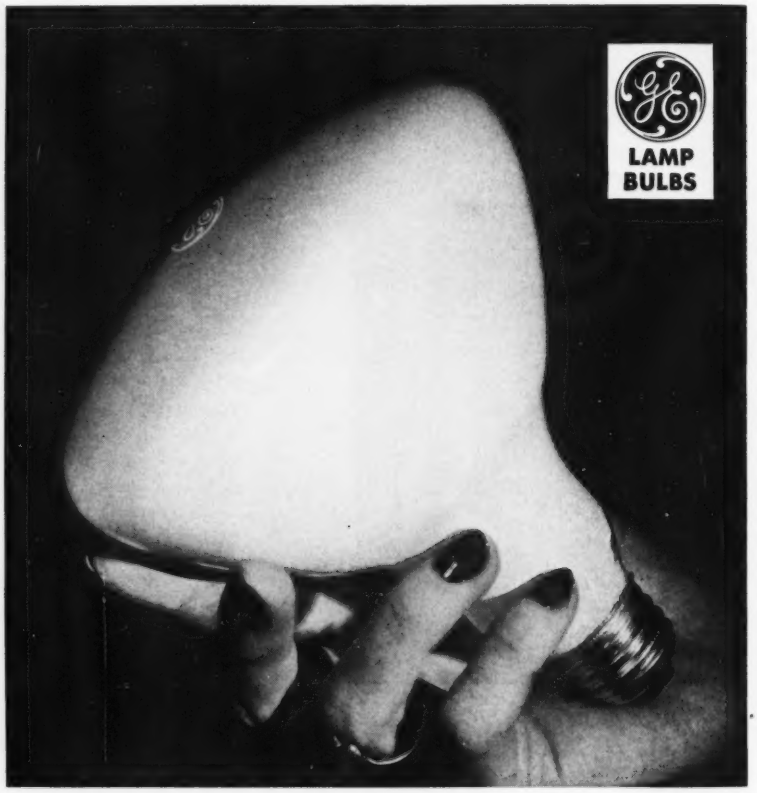


BALANCE OF UPWARD AND DOWNWARD LIGHT

"ALL-OVER BRIGHT" —GIVES SOFTER LIGHT



CHOICE OF THREE BRIGHTNESS LEVELS

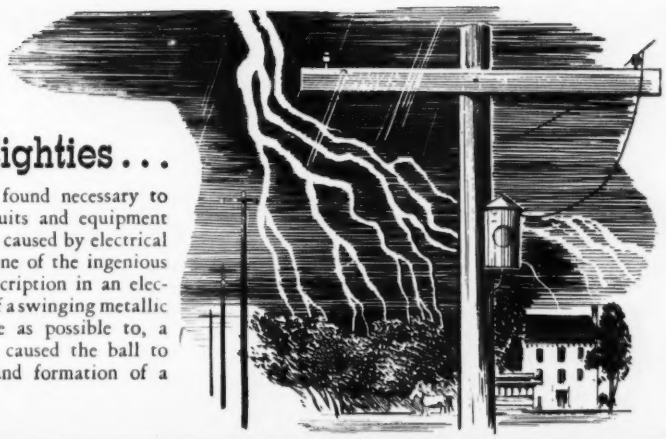


GENERAL ELECTRIC'S new indirect 3-lite bulb was designed expressly for use in portable lamps—both new and old. It has a special shape that directs the light both upward and downward. This pleasing balance of up-and-down light gives better over-all room lighting, makes seeing tasks easier.

The indirect 3-lite bulb also has a new inside white finish—the "Q" coat—which diffuses the light over the entire surface of the bulb, gives an all-over bright appearance. The light is softer; reflected glare is reduced; reading is easier. Room shadows are soft-edged instead of harsh, an effect which is flattering to home furnishings. And the G-E indirect 3-lite bulb gives three levels of brightness at the flick of the switch—50, 100, or 150 watts.

Now being featured in the newest portable lamps, the indirect 3-lite bulb may also be effectively used in old table lamps by means of adaptor units like the one shown at right.

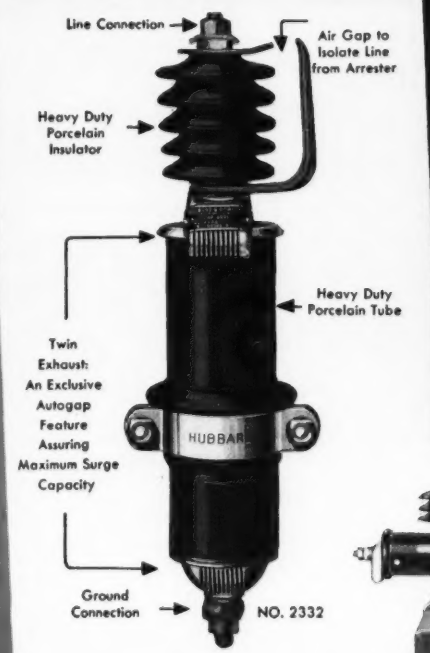
GENERAL ELECTRIC



In the Good Old Eighties . . .

Early in the electrical age it was found necessary to find some means of protecting circuits and equipment against the disturbances and damage caused by electrical storms. The "Razzle Dazzle" was one of the ingenious devices used. "It consists," the description in an electrical publication of that day says, "of a swinging metallic ball suspended above, and as close as possible to, a ground plate or table." Lightning caused the ball to swing, thus preventing a fusing and formation of a permanent ground.

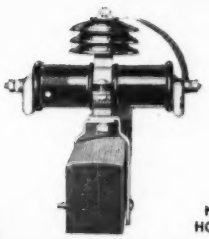
TODAY - The New HUBBARD VERTICAL AUTOGAP


Line Connection
Air Gap to Isolate Line from Arrester
Heavy Duty Porcelain Insulator
Heavy Duty Porcelain Tube
Twin Exhaust: An Exclusive Autogap Feature Assuring Maximum Surge Capacity
HUBBARD
Ground Connection
NO. 2332

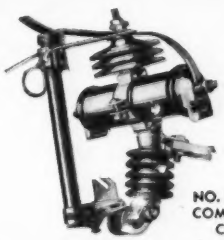
The new Hubbard Vertical Autogap possesses the same principles of design as the Hubbard Autogap Lightning Arrester for horizontal mounting, and offers an optional choice where a vertical mounting is desirable. All Hubbard Autogaps act on the expulsion principle. The follow arc is extinguished before it reaches the first current zero. A bracket is included, for mounting on pole, crossarm or transformer as desired.

Autogaps are also available in cutout combinations. Hundreds of thousands of Autogaps have proven their efficiency over an eleven year period, without a single failure resulting from operating conditions.

Write for complete details and specifications.



NO. 2302 HORIZONTAL STYLE



NO. 2315 COMBINATION CUTOUT

HANG THE LOAD ON HUBBARD HARDWARE

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH CHICAGO OAKLAND, CALIF.

ELECTRA'S HUSBAND

Adding Jet Propulsion To Inflation Spiral

"THERE was an economist on the radio today talking about prices and inflation," Electra said one evening at the dinner table by way of making conversation. "His explanation was so technical and involved that I couldn't understand what he was driving at. I wish that some one would explain this inflation thing to me in simple language."

Even though I knew that the question was directed toward our guest—an electrical manufacturer—I thought it best to register my ignorance on the subject.

"Don't look at me," I said. "I never took any courses from Ira B. Cross at college. I've never known an economist who talked simply."

"What confused you," our guest said to Electra, "was that the chap on the radio probably talked about credit control, inventory control, liquidation of personal savings to buy goods for hoarding, gambling in raw materials and lack of all-out productive effort. They all have an effect on the inflationary spiral. So too does the failure of Congress to enact a realistic tax program."

"Don't mention that word," I interrupted. "Uncle Sam took a double bite on March 15 and now the state of California wants its share. Between the two of them, we're on a deficit financing basis right now."

"Let the man talk," she chided.

"Well, we are having a discussion with the UE in our factory right now," the guest continued, "which tells the story of inflation about as simply as anything. Reduced to the least common denominator, inflation means that you have to pay more and more for what you buy. Another way of defining it is to say that your dollars have less and less purchasing power.

"Our union wants an escalator clause in its contract geared to the cost of living. A lot of such agreements have been made in recent times, notably in the automobile industry. At a time like the present an escalator clause in a wage contract just adds jet propulsion to the inflationary spiral. One of the real twin villains in the inflation tragedy is the continuing rise in farm prices—27% since Korea. The cost of living will keep on going up if farm prices do, because food is such a major item in the index. And under the farm parity program, farm prices will keep going up if the prices of other goods and services—including wages—keep on going up."

"I see—a sort of see-saw effect," Electra commented. "But how can it be stopped? A thing like that can go on forever."

"Well, there is no one place to start," our friend continued. "All factors in inflation must be curbed simultaneously and equitably. If we really want prices to stop going up—and too many people apparently don't want them to stop going up—we must stop doing the things that cause prices to go up. If we don't stop the causes, no amount of price control can keep prices from going up—if we are going to get the goods.

"Wages in the end make up 80 to 90% of the prices of goods. If we want to stop prices from going up, we must stop wages from going up. It's as simple as that at this moment. Of course there are other factors, too, which must be taken into consideration.

"However, every 10% increase in wages now will necessitate price increases extending over one to six months from now. Under an escalator wage plan tied to the cost of living where wages must be adjusted every quarter, wages would have to be raised every three months on the basis of the new wage costs put into the cost pipe-line during the previous one or two quarters."

"Where does the thing stop?" Electra asked.

"Your guess is as good as mine," our guest answered. "The continuing escalator clause is the second of the twin villains I spoke about. If it is too hot politically for its inflationary influence to be curbed directly—and if—a big if—we are serious about correcting inflation, we must take a much more direct course. That would include rigid price controls and such steep direct taxes on everyone as to permit none of the taxes to be collected from the public indirectly in the form of increased prices for goods and services."

"No politician is going to buy that program, that is, if he expects to stay in office," I interrupted. "Congress isn't going to enact any such income taxes as you suggest."

"Probably not," he said.

"But what can people like me do?" Electra insisted.

"You sit back and hope for the best," he answered. "You *can* write your Congressman and protest and protest the spiraling prices. You can urge your friends to do the same. It's everybody's job."

"REMEMBER that young aviator who wrote the letter from Korea?" Electra asked one evening recently. "Well, he's a captain now and he's won the Distinguished Flying Cross. I thought perhaps you would like to read the citation."

She handed me a sheet on which the citation had been typed. Here are some extracts telling about miraculous feats of B-26s:

"Unable to strike the primary target due to weather, Captain L—— contacted an air controller who requested ground support in an extremely hazardous mountainous area. The weather was such that low-hanging clouds obscured the tops of the mountains and visibility was often less than one mile in rain showers. Further the aircraft were loaded with 1,000-lb bombs with instantaneous fuses and the ceiling necessitated bomb release at dangerously low altitudes. In spite of these extremely hazardous conditions and after considerable effort, Captain L—— demonstrated outstanding airmanship by leading his flight in a very effective strike against enemy troops located in a mountainous ravine and thus aided considerably in effecting the rescue of surrounded friendly forces."

Expanded Assembly Lines Increase CURVACORE Transformer Production

IT IS NOW EASIER to obtain *Curvacore* distribution transformers. Production facilities are expanded. You'll be able to take advantage of the inherent benefits of *Curvacore* transformers sooner.

Curvacore transformer design improvements give more performance for your distribution dollar. Cold rolled oriented steel strips have high flux carrying capacity and low hysteresis loss. The core steel is wound, shaped, annealed and cut into two turn lengths. Then each length is fed through the coil structure so that it retains its original core shape.

You benefit from these improvements:

1. 50% lower exciting current
2. Better ratio of losses
3. Improved short time thermal capacity
4. Size and weight reduced 15%
5. Regulation improved up to 15%

This wound core design provides a more efficient path for the magnetic flux, resulting in low exciting current. The *Curvacore* transformer has better thermal performance, too! Increased cooling area within the windings reduces the copper-to-oil temperature gradient, improves regulation and adds years to service life. Weight is reduced, making the *Curvacore* transformer compact, easy to handle and to install.

Former Advantages Retained

In addition to *Curvacore* transformer design you still get *Spra-Bonderized* tanks with 3-coat baked-on finish of alkyd-resinous paint; simplified high voltage angle bushings with handy chuck type connectors; sturdy tank construction; high quality craftsmanship throughout.

For more information about the *Curvacore* transformer, contact your local Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3366

Typical core and coil assembly shown above. Present ratings of *Curvacore* transformers are 25 kva and below. Others will be available shortly.

Curvacore is an Allis-Chalmers trademark.

ALLIS-CHALMERS

YOU CAN BE SURE.. IF IT'S
Westinghouse

USEFUL LIFE OF WEMCO C TRANSFORMER OIL INCREASED THREE TIMES

Inhibitor Added

Greater freedom from oil maintenance problems! Development of a new inhibiting agent, and its addition to WEMCO C Transformer Oil, has resulted in greatly increased service life.

All the advantages of standard WEMCO C are maintained: low viscosity . . . freedom from acids, alkali, and corrosive sulphur . . . resistance to emulsification . . . freedom from sludging for long (now even longer) periods of service. *Inhibited WEMCO C* now maintains all these properties *three times longer!*

Now supplied as standard in all Westinghouse Distribution Transformers (both "CSP"® and conventional), *Inhibited WEMCO C* will shortly be standard in Westinghouse Power Transformers and will also be available for replacement use. For further information, contact your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70575

Westinghouse
DISTRIBUTION TRANSFORMERS

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver.

MAY 1951 Vol. 106, No. 5

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

Utilities Are Mobilized for Disaster Relief

When disaster strikes, whether it be from natural causes or from a sneak atomic bomb attack, utilities in California and other Western states will be prepared in advance with a plan of action. As part of the civil defense and disaster relief planning a separate utility organization has been established in California under the direction of Robert P. O'Brien of the Public Utilities Commission as chief, with individual organizations for water, gas and electric services.

The California civil defense and disaster relief plan is based upon two fundamentals—self help and mutual aid. The over-all purpose is manifold. Basically it is to provide for the mobilization, organization and direction of the civilian population and necessary supporting agencies to prevent or minimize the effects of enemy or subversive action directed against populations, communities, industrial plants, facilities and other installations, and to maintain or restore those facilities essential to civil life. It will function equally well in natural disasters.

Several assumptions had to be made in setting up the program. Here are some of them as set forth in the civil defense manual: "(1) That war may involve enemy action against the civilian population and property with little or no warning utilizing any method to achieve material gain. (2) That sabotage is a major enemy policy and capability. (3) That atomic weapons will be employed against only the most strategic installations, facilities and densely populated areas. (4) That the President of the United States will not declare martial rule. (5) That evacuation of elements of population centers, compulsory or voluntary, will be undertaken only in the event of threat or imminence of sustained or heavy enemy air attack or of invasion in force. (6) That contiguous states will render material support and assistance, as practicable."

For purposes of administration and proper functioning the state has been divided into 10 regions with delegation of responsibility then to a county and city level. In the case of the utilities, however, the operation of the plan in the case of disaster will be on a system basis. In setting up county or community organizations, no utility operating personnel will be drafted since their duties are largely predetermined in cases of emergency. Accounting, commercial and clerical people may serve, however.

As chief of the Division of Utilities, Robert P. O'Brien has a policy committee to assist him in delineating general policies and in coordinating the utility aspects of the program with the master plan. Personnel includes:

D. D. Smalley, vice-president in charge of operation, PG and E, chairman.

H. L. Masser, executive vice-president, So. Calif. Gas Co., vice-chairman.

W. N. Johnson, vice-president in charge of operation, So. Calif. Edison.

J. E. McCaffrey, general manager and chief engineer, Sacramento MUD.

F. A. Hough, vice-president and executive engineer, Southern Counties Gas Co.

E. D. Sherwin, vice-president in charge of operation, San Diego G&E.

Julian Hinds, general manager and chief engineer, Metropolitan Water District.

S. B. Morris, general manager and chief engineer, Los Angeles Dept. W&P.

C. P. Harnish, president, Southern California Water Co.

J. W. McFarland, general manager, East Bay MUD.

Primary purpose of the utility program is to assist in every reasonable way in providing the citizens of the state the maximum possible availability of supplies of gas, water and electricity during the period of a "state of extreme emergency" as proclaimed by the governor. The objectives as set forth in the basic plan of operation are: (1) To integrate, coordinate and correlate the resources, equipment and

DO'S AND DON'TS

Upon Receiving Warning of an Impending Attack.

Much conflicting information has been given to the public as to emergency procedures to be undertaken by individuals in regard to water, gas and electricity upon receiving warning of an impending attack. The instructions below have been carefully compiled by responsible utility authorities. Please give these instructions wide publicity.

INSTRUCTIONS TO THE PUBLIC

Your gas, electricity or water utility has emergency operating procedures which are designed to best safeguard the community. When safety measures are necessary, utility supplies can be cut off in danger areas most effectively by utility service crews. Follow the advice of your local utility manager.

DON'T SHUT OFF YOUR GAS SERVICE! You may need the heat during the emergency alert and dangerous accumulations of gas may be released into homes or buildings if service is restored by untrained people.

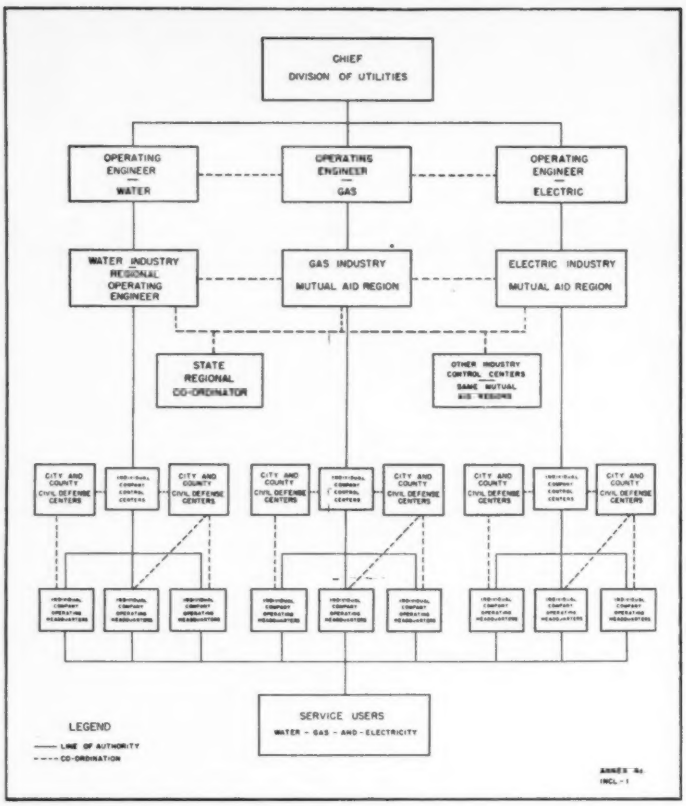
DON'T SHUT OFF YOUR ELECTRICITY! You may want your radio which may be your only means of receiving official instruction, or your clock, or a hot plate, or even a light in your bomb shelter.

DON'T SHUT OFF YOUR WATER SERVICE! You may need your sanitary facilities or water may be needed quickly to put out small fires.

DON'T draw quantities of water into bath tubs or other containers! This would only reduce pressure in mains and also result in an unnecessary waste of water which may be badly needed. Storage water heaters have sufficient supplies for emergency drinking and cooking needs.

Do shut off irons, toasters, stoves, and other appliances as though you were going out for the day.

At the behest of the state authorities, messages like the above have been sent to the customers of most of the utility companies because of misinformation which had been spread through radio broadcasts to the effect that utility services should be shut off



Utilities—water, gas and electric—have been mobilized under a single director into a comprehensive and coordinated organization for combatting disasters as shown

work forces of these utility systems of the state to obtain maximum benefit from the application of the principle of local self help and community mutual aid. (2) To define the methods of procedure to be followed in maintaining, establishing or re-establishing water supplies and energy services at the time and place needed, and in the quantities required by prevailing circumstances. (3) To delineate at any time the extent of the pools of manpower, equipment and materials available for alleviation of distress and to utilize such resources in case of disaster.

Certain general assumptions were established in connection with the utility program in addition to those enumerated above for the basic plan. Included was the assumption that agreements and legislation would protect the legal and financial responsibilities of the organizations and individuals participating in the program. It was assumed furthermore that a uniform state-wide customer priority classification was to be established by the utility industry in coordination with the California Public Utilities Commission and that such priority classification will be applied by the industry to obtain maximum advantage from the pooling of resources in the event of the existence of a state of extreme emergency. Finally, it was assumed that any disaster operational procedure might involve one or more of the following stages: Normal operation under an alert for possible disaster; disaster operation in the case of a single city or county with adequate mutual aid; disaster operation involving regional resources and disaster operation on a state or interstate basis.

In the case of a disaster of major proportions, whether natural or caused by enemy attack, the mutual aid to be supplied falls into four different categories. In the case of the electric utilities the first of these is power exchange to the capacity of existing system interconnections. Second is manpower and here the feeling is that maintenance and construction crews would represent the major demand. A third category is tools and equipment and the final one consists of materials and supplies for the restoration of service.

A separate committee for programming the actual operating procedure in the case of disaster has been set up for each of the utility services. The electric system planning committee consists of the following personnel:

G. H. Hagar, manager of electric operation, PG and E.
C. E. Heath, administrative assistant, So. Calif. Edison Co.
Ivan L. Bateman, electrical engineer in charge of operation, Los Angeles Dept. W&P.
H. A. Noble, general superintendent, San Diego G&E.
H. W. Warmoth, assistant general manager, Sacramento MUD.
H. E. Pangborn, general superintendent, Calif. Electric Power Co.
G. E. Bishop, electrical superintendent, Coast Counties G&E.
C. E. Plummer, chief engineer, Modesto Irrigation District.

Each committee member has one or more alternates.

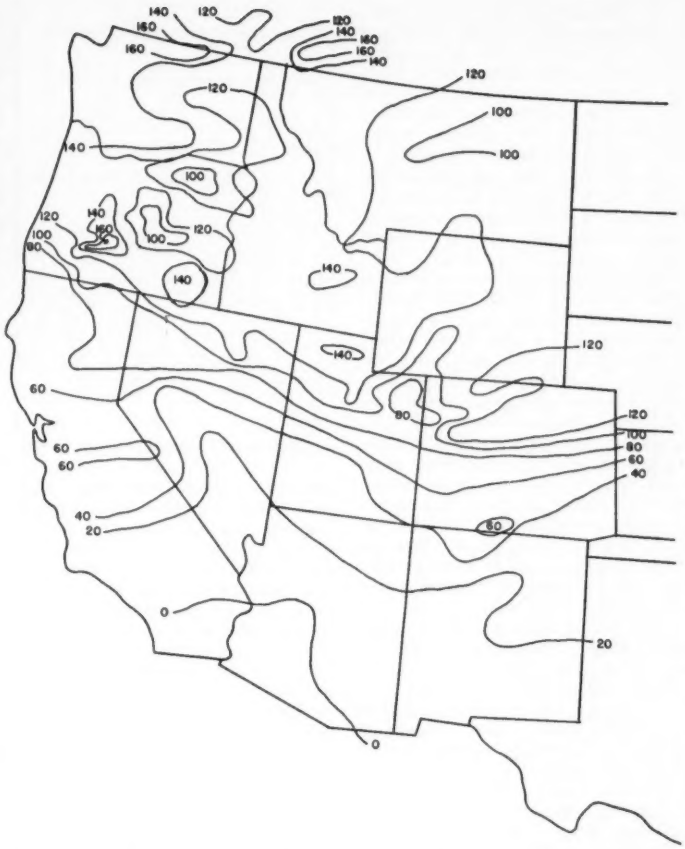
Since the California plan is based upon the assumption that there will be no mass evacuations, it is conceivable that civil defense authorities will set up road blocks to discourage general travel on many of the principal highways surrounding any community which might be bombed or otherwise attacked. A system of civil defense emergency passes has been developed to facilitate travel by those individuals whose emergency duties require statewide travel or operation. A special series of utility emergency passes is included in this plan. Experience with past disasters, especially the Long Beach earthquake, indicates the necessity for passes of this nature. Every community adjacent to Long Beach set up road blocks to prevent curiosity seekers from entering the area damaged by the earthquake. Because of lack of other instructions, those manning these road blocks treated utility emergency personnel and construction forces in exactly the same fashion as the general public.

Object of the utility emergency passes is for the purpose of dispatching reconnaissance and emergency service personnel and vehicles into restricted areas.

Part of the program involves public and customer education. Already many utilities have circularized customers with instructions prepared by the state civil defense authority relative to utility services. Sometime in the near future tests of the program will be made on a trial basis.

Here sample is taken in shallow snow

Earth plug is cleared from sampler. Plug proves entire snow depth was sampled



Prospective stream flow April-September 1951, as prepared by the United States Soil Conservation Service. Figures shown in map are per cent of 1940-1949 average

Drought, Floods Forecast

R. A. Work
Senior Irrigation Engineer, Medford

Clyde E. Houston
Irrigation Engineer, Reno
Soil Conservation Service

Water is Power. This is as true in the West now as it was in the days of the cattle barons. Lack of, or unwise use of water, could hinder development.

Practically all Western hydroelectric power producers use water wisely by forecasting seasonal supplies and regulating operations acordingly. Should a forecast be for shortages, steam plants are prepared and perhaps put in operation prior to the shortage. Should a forecast be for plentiful or excess water, reservoirs are regulated to make use of each acre-foot with a minimum of waste. The basis for most of these forecasts is the science of snow surveying. Each year ELECTRICAL WEST presents this West-wide forecast of water supplies as prepared by the U. S. Soil Conservation Service* from data collected at 1,000 snow courses on the mountainous watersheds of the West.

Again, as in 1950, there are possibilities of localized floods in the Columbia River basin, while the serious drought in the Southwest shows no sign of ending. Heavy snow cover in the mountains is reported from British Columbia. Snow conditions there are such that a cold backward spring, if it should occur, will produce damaging high water on the Kootenay and Okanagan rivers. High flow stages are in prospect on the Kootenay and Washington's Methow River, even under most favorable melt conditions. However, if normal melting conditions prevail, the spring flood potential on the lower Columbia most likely will not be serious.

*The Division of Irrigation and Water Conservation is the federal coordinating agency of snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Forest Service, National Park Service, Geological Survey, various departments of the several Western States, irrigation districts, power companies, and others. The California State Division of Water Resources conducts and coordinates snow surveys in that state, while the British Columbia Department of Lands and Forests, Water Rights Branch, has charge of the snow surveys in that province.

The long series of short water years, broken somewhat in 1949, continued in the Southwest in 1950. Unless rainfall there is abruptly magnified, critically short water supplies are foreseen for Arizona, southern and south central California, New Mexico, southern Utah, and southern Nevada.

In the following paragraphs the water supply outlook is reviewed state by state. Three charts illustrate graphically reservoir storage and expected stream run-off.

Arizona — Arizona is entering its main irrigating season with one of the poorest outlooks for water in almost a half century of record. Streams flowing into the major reservoirs of the state have carried miserly base flow during the entire run-off season. The reservoirs of the state now store water only to 7% of capacity. No further run-off from snow melt can be expected. Snow cover, short all winter, for the most part has been dissipated by high winds. February through June run-off into the major reservoirs will be approximate-by 16% of normal, totaling about 140,000 acre-ft of water.

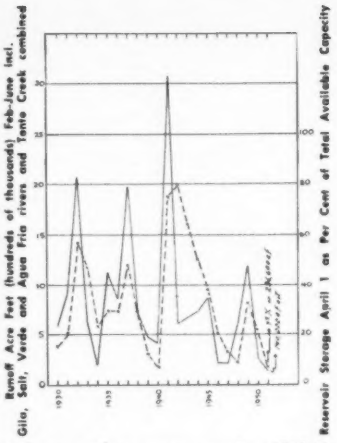
The water allotment in the Salt River project has been cut to 1½ acre-ft per acre. This means that irrigators must cut their acreage one-third to one-half in order to insure marketable crops. The Gila River project will have one-half acre-foot of water per acre of land at Coolidge Dam. However, considering seepage losses, the delivered amount will be still less. Most of the farmers in the Gila River project are planting only 20% of their land and many others are not planting at all. The Gila River probably will be a dead stream by May 15. Pumping costs in both the Gila and Salt River basins will be greater this year because of the most recent 10-ft recession in ground-water level.

The Maricopa Water Conservation District, which distributes the water from Carl Pleasant Dam (capacity 179,000 acre-ft) will receive no surface flow and will have to rely entirely on pumped water. The pump head here now exceeds 300 ft.

The Little Colorado River has experienced practically no run-off all season.

The state as a whole probably will enter the winter months of 1951-52 with as little reservoir storage as ever recorded. A special chart shows the 1951 water project for Arizona as compared with that of the preceding 21 years.

California—California's 1951 summer water supply will be deficient. Snow pack is definitely below normal


Runoff, Acre Feet (hundreds of thousands) Feb.-June incl.
Gila, Salt, Verde and Agua Fria rivers and Tonto Creek combined
Reservoir Storage April 1 as Per Cent of Total Available Capacity
1930
1935
1940
1945
1950

Arizona surface water supply, 1930-51

over the entire length of the Sierra. On the Kern and Kaweah watersheds less now exists as of April 1 than in the years 1931 and 1934. This is the driest season since comprehensive snow surveys began on those watersheds 22 years ago. Summer flow of Kaweah and Kern rivers apparently will be less than that of 1924, which was the lowest summer-flow year of record. The greatest deficiencies of summer flow are expected on streams that experienced their highest flood crest of record following the storms of November and December.

The snow pack on the upper Sacramento River gives promise of the best percentage of normal flow for any of the Sierra streams. However, even on this watershed run-off only 80% of normal is expected. Reservoirs are now at favorable stages, and most should fill during the early spring run-off. However, the large multi-purpose reservoirs such as Shasta and Millerton probably will not fill. Lake Tahoe is expected to reach 6,228.7-ft elevation, the highest since 1946.

No significant rain has occurred in California since March 9 and at the time of this report the drought continues. Unless substantial rains occur during April and May, summer flows forecasted herein will have to be revised downward.

Colorado—Mountain snow cover is well above normal along the Continental Divide in the northern part of Colorado. In western Colorado the high-elevation snow cover is slightly below normal. In southern Colorado the snow cover is definitely deficient. Run-off during the snow-melt season should be well above average on the South Platte and its tributaries, on the main stream of the Arkansas and on the upper Colorado River. On the Yampa, White and Gunnison rivers the summer run-off will be about normal. On the Dolores, San Juan, Rio Grande and the southern tributaries to the Arkansas the summer run-off is not likely to exceed 50 to 60% of average. Soil moisture conditions are only fair in irrigated areas especially in the San Juan and Rio Grande basins where the soil is extremely dry.

Idaho—All the rivers in Idaho, with the exception of Lost River, have snow water stored in the mountains varying from 4 to 30% above normal. This general condition assures above-average water supplies for irrigation and power throughout the state. Some snow melt during February has kept streamflow above average. Shortage in some reservoirs has been lowered in anticipation of fair to good water supplies yet to come.

The high-altitude snow courses are showing relatively higher snow water content than the courses at lower elevation. This condition may promote more sustained and dependable flow of water throughout the state than usually occurs when low-elevation snow cover is heavy.

Montana—Snow pack on the upper Missouri River basin is somewhat above average and should provide good irrigation water supplies in 1951. The pack this year is not quite as great as in 1950 or 1949, but is greater than in 1948. Thus, potential flood hazard in parts of the basin should not be overlooked. Because of orderly snow melt, controlled streamflow resulted in 1949 and 1950. The 1948 melt season was accompanied by high temperatures and precipitation in such amounts as to cause rapid snow melt, which produced floods on most rivers and tributaries. Consequently, realization of the 1951 flood potential will depend entirely upon meteorological events in the basin during the next two or three months.

Upper Columbia River Basin in Montana also shows above-normal snow pack this season. Potential flood hazard of modest proportions now exists on some headwater streams of Columbia River in Montana. The magnitude of this potential depends entirely on melting conditions during the snow-melt season. In any event, very good water supplies for the basin are foreseen.

Nevada—The drought of the Southwest is continuing its move northward into Nevada and at this time it encompasses the southern two-thirds of the state and the eastern slope of the Sierra Nevada. The only bright spot is the Humboldt River, which is expected to flow 150% of normal. The

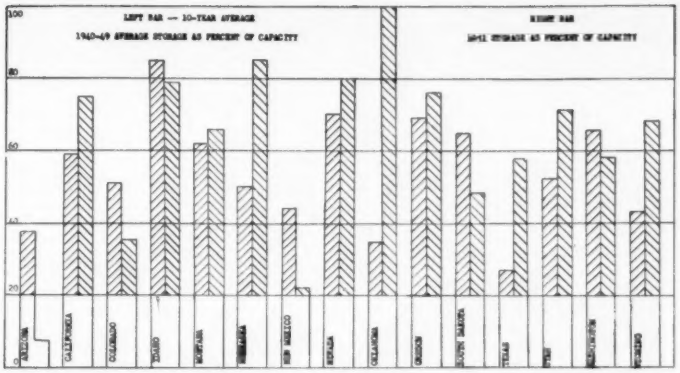
floods of last November and December were a blessing in disguise for they filled reservoirs and mountain and valley soils. Run-off of snow-stored water will be less than 50% of normal from the Sierra while the central and southern part of the state will realize only from 10 to 25% of normal. Storage in Lake Mead equals 95% of last year but less than 90% of normal for this date.

New Mexico—A critical shortage of irrigation water is foreseen this season for lands along the Rio Grande. Snow cover in northern New Mexico is very deficient with many snow courses showing the least since surveys were started in 1937. The summer flow of the Rio Grande through New Mexico will not exceed 25% of the irrigation water demand. El Vado reservoir, supplying the middle Rio Grande area, is practically empty. Storage in Elephant Butte reservoir and Caballo reservoir is about 400,000 acre-ft. This amount will supply about one-half of the normal irrigation-water demand in the lower Rio Grande Valley. Considerable amount of crop curtailment will be necessary. Soil moisture conditions in all irrigated areas are reported as dry.

Oregon — Water supply for 1951 will be good to excellent generally. Reservoir storage for the entire state, with few exceptions, will be adequate. Many reservoirs will hold substantial reserves at the conclusion of the 1951 season. Owyhee reservoir now holds a two-year supply and is full for the first time since 1946. The only appreciable snow shortage on watersheds is in extreme southern and southwestern Oregon. Run-off is expected to be above normal throughout the state except for Applegate and Illinois rivers in southern Oregon and in the Grande Ronde, Umatilla River and northern Harney valleys. However, flows in the latter three areas should be nearly average.

South Dakota—Snow cover in the Black Hills has been deficient all winter. The water supply outlook is not much better than fair. Soil moisture conditions in the irrigated areas are reported as dry. Belle Fourche reservoir now stores 94,000 acre-ft as compared to 93,000 acre-ft a year ago and 127,000 acre-ft for the 10-year average (1940-49). Angostura reservoir, newly operating, with capacity of 160,000 acre-ft, has now filled to 32,000 acre-ft.

Utah—Extreme variation is shown in the water supply prospects for Utah during 1951. Severe drought faces all water users in the southern half of the state, with water supplies varying from 25 to 45% of the preceding 10-year average. In northeastern Utah on Ashley Creek, the Whiterocks and Uinta rivers, streamflow will be 65 to 70% of average. Northwesterly from these areas, water supply outlook increases to as much as 40% above average as indicated by the snow blanket on the Cache and northern Wasatch forests. In these watersheds above-normal temperatures during the melt period could produce damaging peak flows. Reservoir storage supplies are excellent in northern Utah. In southern Utah, low reservoir storage will increase the severity of the water shortage.



Storage in Western reservoirs. A few of them have shorter than 10-year records

Washington — Prospects for water supplies in Washington are fair to good. Water stored in snow ranges from 5 to 50% above normal. Snow cover on the Methow River drainage is 50% above average. This implies a serious threat of high water if a cold spring should now occur and delay snow melt until late in the season.

Water stored as snow in British Columbia (nearly one-half of the flow of the main stem of the Columbia River comes from British Columbia) is slightly greater than at this time in 1950, being 30% above normal. However, water stored in snow on other rivers contributing to the Columbia is generally less than in 1950. Even so, a cold late spring coupled with heavy precipitation would cause serious high water on the Columbia again.

Wyoming — The irrigation water supply outlook for both the Green and North Platte River watersheds in Wyoming is excellent. On the Green River the snow cover is 150% of normal. Soil moisture conditions are reported as excellent. The summer discharge of the Green River will probably not be as high as a year ago because of the heavy snowfall during April 1950.

On the North Platte drainage the snow cover is about 110% normal and on the Laramie drainage about 130%. The irrigation water supply for lands below the major reservoirs on the North Platte is assured. Storage in these reservoirs is now about 1,700,000 acre-ft. This is a record high storage and represents two times the past 10-year average. Soil moisture conditions in the upper Laramie Valley and in the Wheatland area on the same stream are relatively poor. Similar soil moisture conditions exist along the North Platte in eastern Wyoming and western Nebraska.

Snow covering the high watershed of the Snake River in western Wyoming varies from 24 to 27% above normal as of April 1. This insures the Jackson Hole area and adjacent lands below in Idaho of a good water supply for the 1951 season. Very good water supplies are foreseen for northern Wyoming, including Yellowstone, Wind, Big Horn, Tongue and Powder river basins.

British Columbia — Water supply prospects for southern British Columbia are very good and far better than average. The Okanogan and Kootenay areas can expect unusually high run-off. Orderly snow melt has already started, but since snow cover is far above average, any interruption of the spring thaw by unseasonably cold weather would almost surely result later in extremely high flows. The flood potential must therefore be recognized although it cannot be so clearly defined now as a month hence. If the present thawing weather continues through April, the flood potential will be materially lessened by May 1. However, in any event, quite high flows are in prospect for Kootenay and Okanogan rivers due to the tremendous snow pack on those watersheds.

Portland General Electric lineman makes a mid-span service tap from an Industrial Monkey on Triplex aluminum cable being used as secondary in urban distribution

New-Type Aluminum Cable Offers Economy and Better Appearance

A. D. Fragall

Assistant Distribution Engineer
Portland General Electric Co.

Substantial economies and improved appearance have led Portland General Electric Co. to experiment with use of a new-type spiraled aluminum cable for services and secondaries. This new cable, made by Kaiser Aluminum & Chemical Corp., is known as "Triplex." It consists of two neoprene- or polyethylene-insulated stranded conductors loosely spiraled around a third all-aluminum neutral. It was made primarily for use as service drops, and has been extensively used for this purpose. (PGE has purchased in excess of 500,000 ft of polyethylene-insulated cable within the past few months.) However, some experimental installations have been made wherein this Triplex cable is used as secondary and services in long-span (260 ft city distribution) construction, eliminating alternate distribution poles.

The two factors motivating this work are the possibility of effecting considerable reduction in line construction costs and the hope of improving the appearance of overhead line construction. The first application was made in connection with a project in the city of Portland where a street was widened, eliminating the existing parking strip and leaving only a 5-ft combination sidewalk and curb outside the property line. In a short section of this project, a 57-kv transmission line had to be rerouted to a good class residential street on which the telephone company already had circuits. Since joint use of poles at that voltage is not feasible and a second pole line does not improve the appearance of the street, special attention was given to making the least objectionable installation.

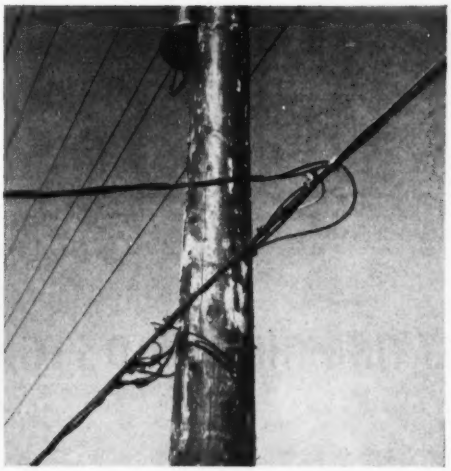
This line was built with approximately 260-ft spans to minimize the number of poles. The secondary distribution is Triplex cable suspended on a street messenger as shown. It was possible to eliminate the center-block poles by taking services off in mid-span.

Construction Methods

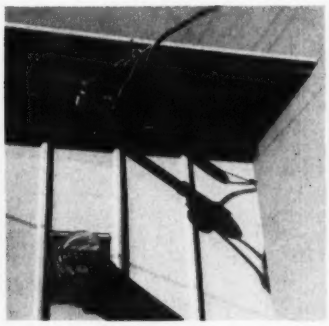
Construction details are being worked out on an experimental basis and a number of different methods are being tried. At present, a ⅜-in. high-strength guy strand is being used as a messenger. It is calculated to be worked to approximately 50% of its ultimate strength when loaded by ice and wind. Although the aluminum cable is very light under normal conditions, it is found to collect a heavy weight of ice. This necessitates a messenger of considerable strength. Thought was given to using an ACSR conductor to serve the dual purpose of messenger and neutral. However, this has not been considered feasible with the material available because of the large-size steel core required to meet strength requirements under conditions of heavy loading. It is hoped that some such arrangement may yet be worked out.

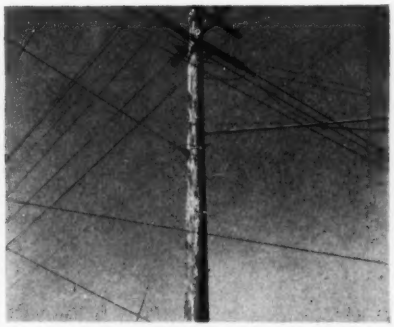
Several methods of arranging service are being tried. Where there are only one or two services to reach from mid-span, No. 4 Triplex cable for each customer may be run along the messenger from the pole to a point opposite the customer's service outlet. This avoids mid-span taps. Where more services are involved, a No. 2 Triplex cable is run from pole to pole supported by the messenger. No. 4 Triplex services are then tapped off as required. Where services pull off the messenger, they are supported by means of a Reliable automatic dead-end clamp. Or in some cases a hot-line tap clamp is used. Connections to the insulated wires are separated six inches to one foot horizontally. A split hose is placed around the bare neutral wire and messenger to prevent shorts while hot secondary connections are being made. The connectors are taped first with a layer of Scotch tape which has a very high dielectric strength. The entire cable may be taped at this point to avoid abrasion. These mid-span connections are made with the aid of the Industrial Monkey. (Electrical West, August 1950, and *Electrical World*, Jan. 29, 1951.)

The cable is bolted to the messenger by means of single-bolt parallel groove clamps to the cable neutral only. Spacing of these is determined principally by the appearance of sag between the strand and the cable. Clamp spacing between 12 and 20 ft appears to be satisfactory. Plans are under way to attach the cable to the messenger by means of a spinning machine. The messenger is attached to



Cabled secondary (left) makes neat appearance. Right: Steel messenger supporting cable is attached to pole with 3-bolt clamp





Triplex (left) consists of two polyethelene-insulated conductors and a bare neutral. Center: House end of service is supported by looping neutral through screw knob and clamping with split connector. Right: Automatic dead-end clamp supports messenger

the pole by means of a 3-bolt clamp. The center hole is used for a bolt through the pole as shown in one of the accompanying photographs. This clamp is spaced away from the pole by means of nuts to prevent chafing of the insulated conductors on the pole.

Large sections of the city are laid out with 200-ft blocks and 60-ft streets. Omission of the pole usually required in the middle of the block results in 260-ft spans. This has been the basis of these experiments. Special arrangements with the telephone company must be made if joint use of poles is contemplated in spans of this length. Such joint construction is planned, but has not been installed.

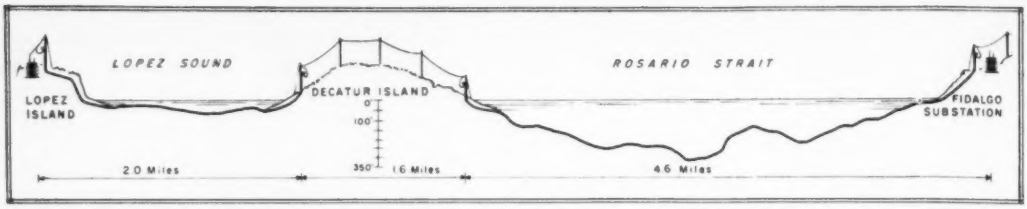
The problem of maintenance has been studied and at present does not appear to be serious, especially when high maintenance cost of poles is considered. Tests on this cable have been made in the company's laboratory. These included accelerated aging tests and tests to determine ability to withstand abrasion and whipping oscillations. These coupled with information so far available on polyethylene indicate a good resistance to weathering. Probable life is estimated to be in excess of 30 years.

Large Savings

Actual cost comparisons are not available from this limited use and can only be estimated. However, it appears that as much as 30 to 40% reduction in cost over the use of individual aluminum conductors in typical rack construction is possible. Principal saving is in the number of poles required. The cost of the additional poles far outweighs the additional cost of the cable, guy strand and heavier anchor. So far as can be estimated at this time, labor will not differ materially from standard rack construction after cable installation has been standardized by experience.

Besides substantial savings and greatly improved appearance of this new-type cable conductor when used for services and secondaries, there is a collateral advantage in addition. Voltage drop is appreciably less on the cable as compared with open wires on racks or crossarms. With equal voltage drop the cable may carry in the order of 15% greater load.

Summarizing the ideas developed so far with this experimental work, it appears that cable of this type has many advantages, particularly where mid-block poles can be eliminated in urban construction. How universally it may be applied depends upon further experience. At least it can be said at this time that prospects for its further development and use are most encouraging.



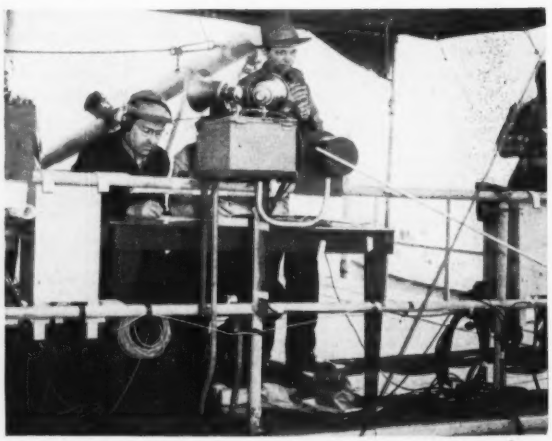
1 Spectacular and complex engineering problems developed when surveys by BPA engineers determined that an underwater routing was the most practical and economical means of bringing power to the San Juan Islands in Puget Sound. Salt water corrosion, 140 psi water pressures and depths up to 325 ft were encountered but success was achieved in . . .

LAYING THE WORLD'S LONGEST SUBMARINE POWER CABLE

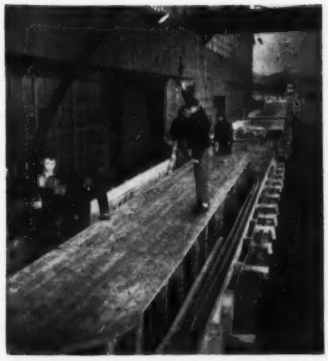
5 On the morning of April 17 a helicopter carried a line from shore to the cable-laying ship "Puget Power" which was handled by three tugs. Laying speed was approximately 3 mph. First section to be laid extended from Lopez to Decatur Island

6 A let-off set up of sheaves and brakes paid the cable out over the stern under carefully controlled tension and speed

9 The 25-kv cable was the longest ever manufactured. Here Okonite Chief Engineer R. J. Wiseman (left) shows cable construction to BPA Engineer A. A. Osipovich

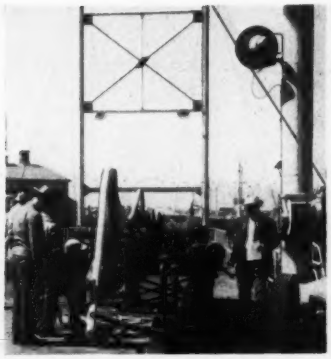


10 As the cable was laid one engineer kept a careful check on tension which went up to 5,700 lb, while a second gave directions over an intricate and complete ship-to-shore communication system

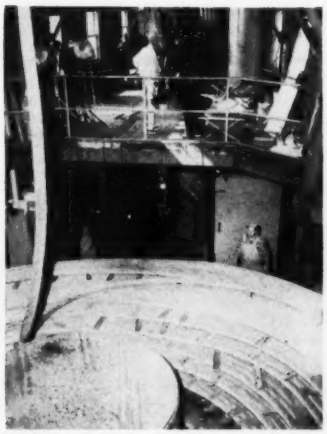


2 Seven miles of cable were manufactured in one length by Okonite at Passaic and shipped in nine gondola cars chained and welded together for safety

3 The 3-conductor, 300 MCM shielded and armored copper cable was unloaded in Seattle directly on the cable-laying ship over a record-size sheave

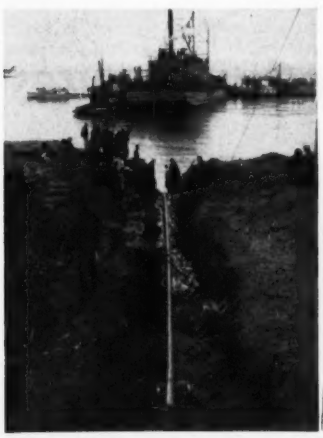


4 The same sheaves and braking equipment used for laying the cable was used to stow it in the two holds of the cable ship to insure easy paying out



7 Cable was stowed in two holds so as to facilitate paying out without kinking. Wooden wedges separated layers of cable

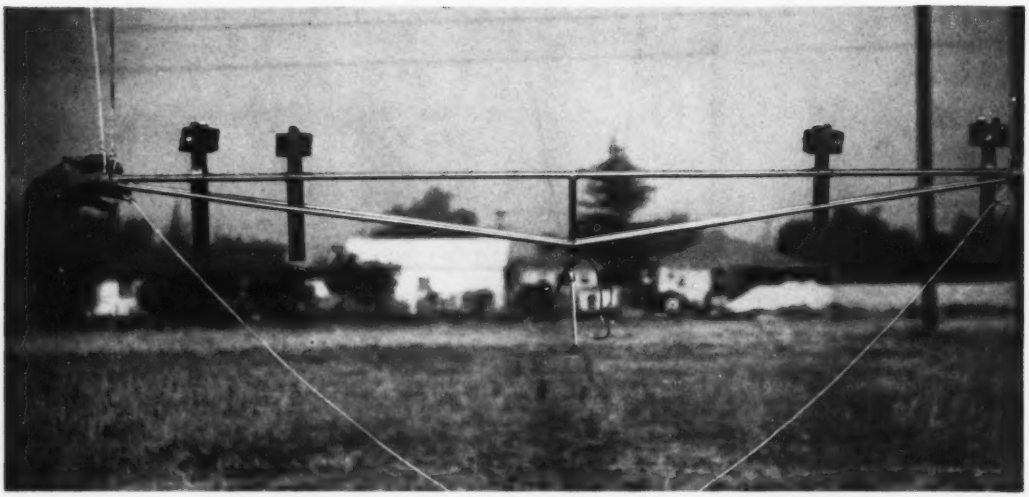
8 At the shore end when shallow depths were encountered a section of cable was put aboard a barge and hauled ashore with winches. The 39,200-ft cable was cut into two lengths during the laying and an overhead connection made across Decatur Island



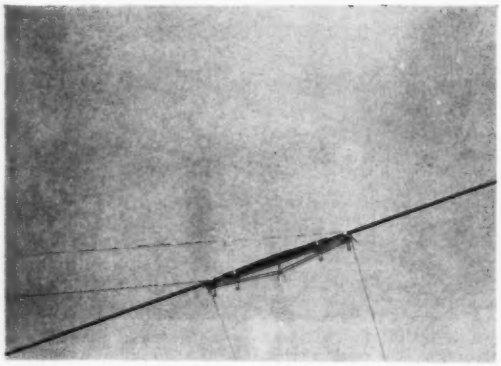
11 At the shore end the cable was laid in trenches. Orcas Light & Power Co. is utility serving the San Juan Islands

12 At all times the exact course was plotted from radio-equipped triangulation stations at two-minute intervals

13 One of the last jobs was to test the cable. Each leg was successfully subjected to 50 kv d-c for a 15-min. interval



Rack carrying four maximum reading thermometers is held in close contact with splice in energized ACSR transmission conductor



Double headlines (left) hold rack on conductor. Right: Thermometers are mounted in two brass tubes cushioned with sponge rubber

Detecting and Repairing Defective Splices

Thermometer rack used to locate defective splices in ACSR conductor. Preformed armor rods may be solution to repairs

Jordan Lummis

Transmission Engineer
Southern California Edison Co., Los Angeles

Because there was some evidence of above-normal resistance in older ACSR compression splices of its own 220-kv lines and because of splice troubles reported in the lines of other utilities, Southern California Edison Co. has carried on an intensive study on older ACSR splices since 1949. This study started with the splices of a line constructed in 1923 but which has been cut, rerouted and relocated to meet increased load demands so that there are a number of new splices on old conductor. Several of these splices have been cut out of the line and a laboratory study of them made by Dr. R. W. Sorenson of the California Institute of Technology. The results of his study show that the splices are mechanically sound but that chemical reactions of the filling compounds, of the kinds used in the past, have caused a progressive increase in resistance. Where old, corroded conductors had been spliced the conditions were aggravated by inability to make perfect contact through the corrosion products and points of high resistance developed with consequent local overheating.

A 45-lb bow will shoot a lead-pointed arrow, carrying a nylon fishline, 150 ft into air. A handline can be thrown only 60 ft

Laboratory study of more than a representative sample was impractical and methods of determining the condition of splices while in service were investigated. Direct measurement of resistance is possible using a secondary power source to determine potential drop but line outage is necessary for such a test. The method of Messrs. Leslie and Waite of the Hydro-Electric Power Commission of Ontario has many attractive features. This method involves the use of a total radiation pyrometer, with a thermistor bolometer as the sensitive element, for optically measuring the temperature rise in a splice from a distance. However, the radiation pyrometer was not available as an assembled unit nor could it be assembled without considerable time-consuming experiment and development. In addition, accuracy of the earlier instruments was somewhat doubtful.

Infrared Photography Tried

Looking toward a simpler means of measurement, infrared photography was tried but the time of exposure was too great for practical use. Since direct contact with a mercury thermometer was the most straightforward method of determining temperature, means of applying a thermometer to the energized conductor were studied. The rack so developed made it possible to apply four maximum- reading thermometers—one near the probable hot spot near each end of the splice and one, for comparison, on each cable beyond. One of the photographs shows the rack with its four thermometers. Another is a closeup of one thermometer, and a third shows the rack in position on an energized conductor where temperatures are being recorded. A detail of the encasement for the thermometer would show that a small brass cap fits over the bulb of the thermometer to aid in conducting heat from the splice or conductor to the mercury. The thermometer is then inserted into a brass tube through a cushion of sponge rubber. This brass tube is then inserted into another brass tube and rests upon a spring. The spring presses the thermometer against the splice while the rubber squeezes out around the thermometer and against the splice and seals off the air. The prongs at the center of the rack have a light spring between them which makes the first contact with the energized line and prevents arcing to the thermometers. Thermometers can be spaced along the rack at any desired position. The lightweight high - resistance nylon cords for hoisting the rack and the retrieving cord may be seen in one of the illustrations. Accuracy is within plus or minus 2° F. The thermometers must remain in contact with the conductor for about 10 minutes to obtain satisfactory readings. However, is is possible to take 15 readings a day on the average.

Bow and Arrow Effective

The principle factor limiting the speed of taking measurements has been the skill required to throw the hoisting line over the conductor. In any case, the height to which a man can throw a string is limited to about 60 feet. Line-throwing shoulder guns, Coast Guard model, can be used with minimum skill but range is difficult to limit and there is fire hazard and annoyance to residents to consider. The most effective tool for heaving the line has been found to be a bow-and-arrow, and a 45-lb bow will pitch the line over a conductor 150 ft above ground with reasonable certainty.

So far temperatures have been taken on 150 of the 400 splices in the Eagle Bell line. Percentage of splices with above-normal temperature was found to be 1.3% as compared with 20% found by another utility for a similar installation. The average rise above ambient temperature is about 15° F, while the average maximum rise is about 20° F above ambient, all at 180 amp. The calculated temperature for 600 amp would, therefore, be about 250° F and the average maximum about 300° F. One splice has been found with a rise above ambient of 44° F at 180 amp. This would have a temperature of about 500° F at 600 amp.

Method of Replacement

The few splices so far removed from service have been cut out after the conductor was slacked off at a near by dead-end. However, if any extensive program becomes necessary, the splices will be cut out in the air with conductor in place, the work being performed from a platform slung from a crawler crane. Aluminum Company of America is developing a splice long enough to span across the gap of the old splice. A method of chemical cleaning has been developed that will remove the surface deposits from the conductor and insure good electrical contact. Instead of filling the splices with such inhibitors as red lead or zinc chromate in linseed oil vehicles, a neutral, inert petrolatum will be used.

Other approaches to the problem are under consideration. As yet the mechanical strength of the splices has not deteriorated appreciably, but with chemical action causing more heat and greater heat causing faster chemical change, the point will be reached ultimately where strength is endangered. If substantial current could be shunted around the splice, the action of deterioration would stop. The Preformed Line Products Co. has been asked to investigate the possibility of bridging across the splice with armor rods. Such rods in intimate contact with the splice would improve its life further by providing better radiation, but there will be no attempt to have the armor rods replace the splice mechanically.

In designing this shunt, it will have to be borne in mind that the conductor to be contacted is heavily coated with a durable deposit of highly resistant material made up of about 30% ignition loss, 27% silicates, 31% Al_2O_3 and Fe_2O_3 and 12% sulphates (SO_4). The coating is very difficult to remove mechanically and chemical cleaning, in the circumstances, will be impractical because of the difficulty of eliminating residual corrosive compounds. Therefore, the amount of surface gripped will have to be sufficient to overcome the low conductivity that doubtless will prevail.

The whole program of hot splice investigation is being carried on as a continuing test, the results of which will be reported from time to time as progress warrants.

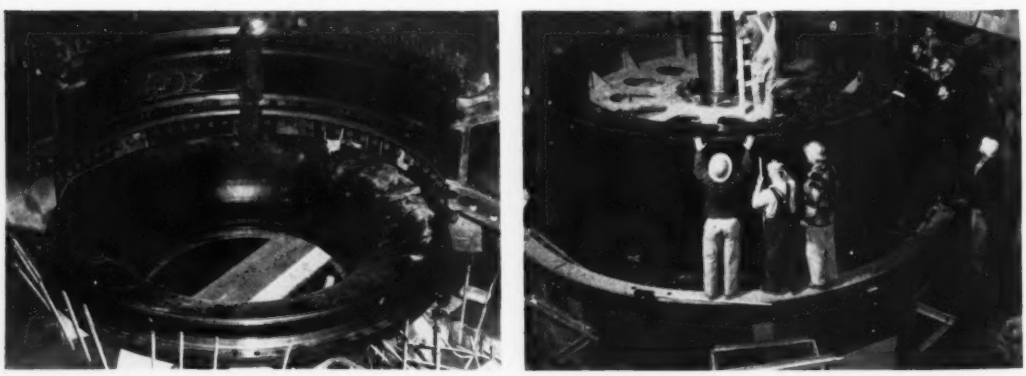
Discharge pipes from Grand Coulee pumps. Grand Coulee Dam and Lake Roosevelt are shown in background

World's Largest Pumps Go Into Operation

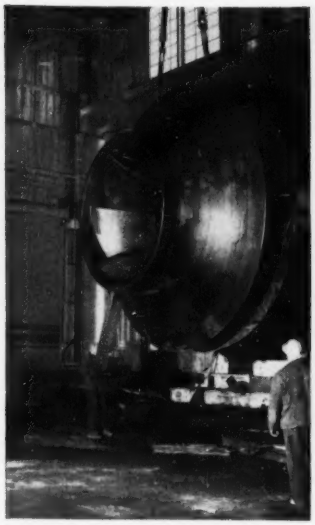
The first of six pumps now being installed in the Grand Coulee pumping plant to lift water from Lake Roosevelt to the Columbia Basin Project was scheduled to begin operation May 12. The pumping plant, the pumps and the motors driving the pumps are the world's largest. Each of the single-stage centrifugal pumps, driven by a 65,000-hp synchronous motor, will lift more than a billion gallons of water per day 280 ft into a distribution system that is eventually to irrigate a million acres of arid land in central Washington. Ultimately, there are to be 12 of these pumps.

The six pumps now being installed were designed and built by the Byron Jackson Co. of Los Angeles and the Pelton Water Wheel Co. of San Francisco. They are guaranteed to deliver 1,350 cfs under a 310-ft head. Expected delivery is 1,600 cfs under the usual pumping head, 280 ft at their normal speed of 200 rpm. The impellers are 13 ft, 11⅜ in. in diameter. They receive water from 14-ft intake pipes through accelerating elbows connected to the 7-ft, 5¾-in. eyes of the pumps. Discharge is through 19½-in. speed rings into the spiral scroll cases of the pumps.

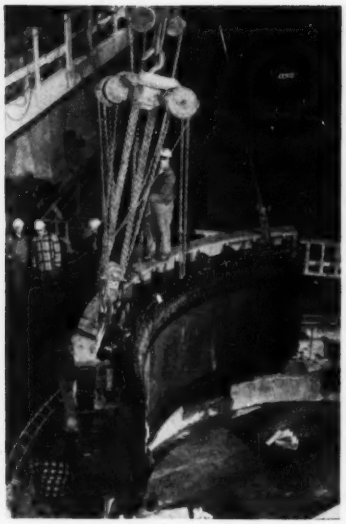
The 7½-ft outlets of the pumps are connected through 61-ft diffusers to the 12-ft pipes that carry the water up into the feeder canal, in the Upper Grand Coulee. There, an equalizing reservoir has been formed by two earth-and-rock dams 27 miles apart.



Pump scroll case at left. Right: Installing 169-ton rotor of moto: after assembly in vacant pump pit



30-ton cast steel pump impeller



Stator quadrant of 65,000-hp motor

This reservoir has a total capacity of 1,202,000 acre-ft with a live storage capacity of 700,000 acre-ft. This storage will make it unnecessary to synchronize the pumping with the water demand, and make it possible to do the pumping in off-peak hours.

The annual water requirements of the Columbia Basin Project may reach 4,000,000 acre-ft, and 23% of it may be required in one month. At that time, there will always be a great surplus of water at Coulee Dam and a minimum demand for commercial power. Surplus water will be carried over the winter in reservoirs on the project, to start spring irrigation, leaving the entire winter and early spring flow of the river for power generation purposes.

Pump Motors

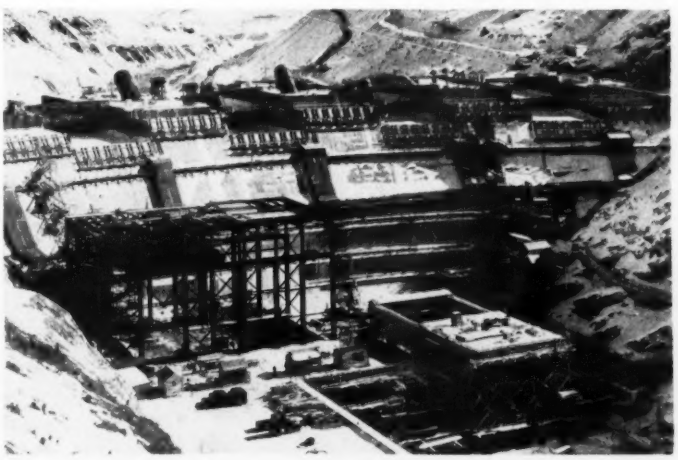
The General Electric Co. furnished the first two of the six 65,000-hp synchronous motors now being installed. Westinghouse Electric Corp. furnished the other four. These are by far the largest motors ever built. They are rated 65,000 hp at unity power factor, three phase, 60 cycle, 13,600 v, 200 rpm. Roters are provided with amortisseur windings for synchronizing.

Thrust bearings on the upper brackets of all motors are provided with pressure oil pumps to force oil between bearing surfaces before the motors are started and while they are being brought up to speed. Brakes, which can be operated also as hydraulic jacks, are mounted on lower brackets. Brakes are not applied until rotors have slowed down to half normal speed after water draining out of the outlet pipes has run the pump in reverse as a turbine. Applying the brakes three or four seconds in 10-second periods will stop rotating parts in five minutes.

Two Motors, One Generator

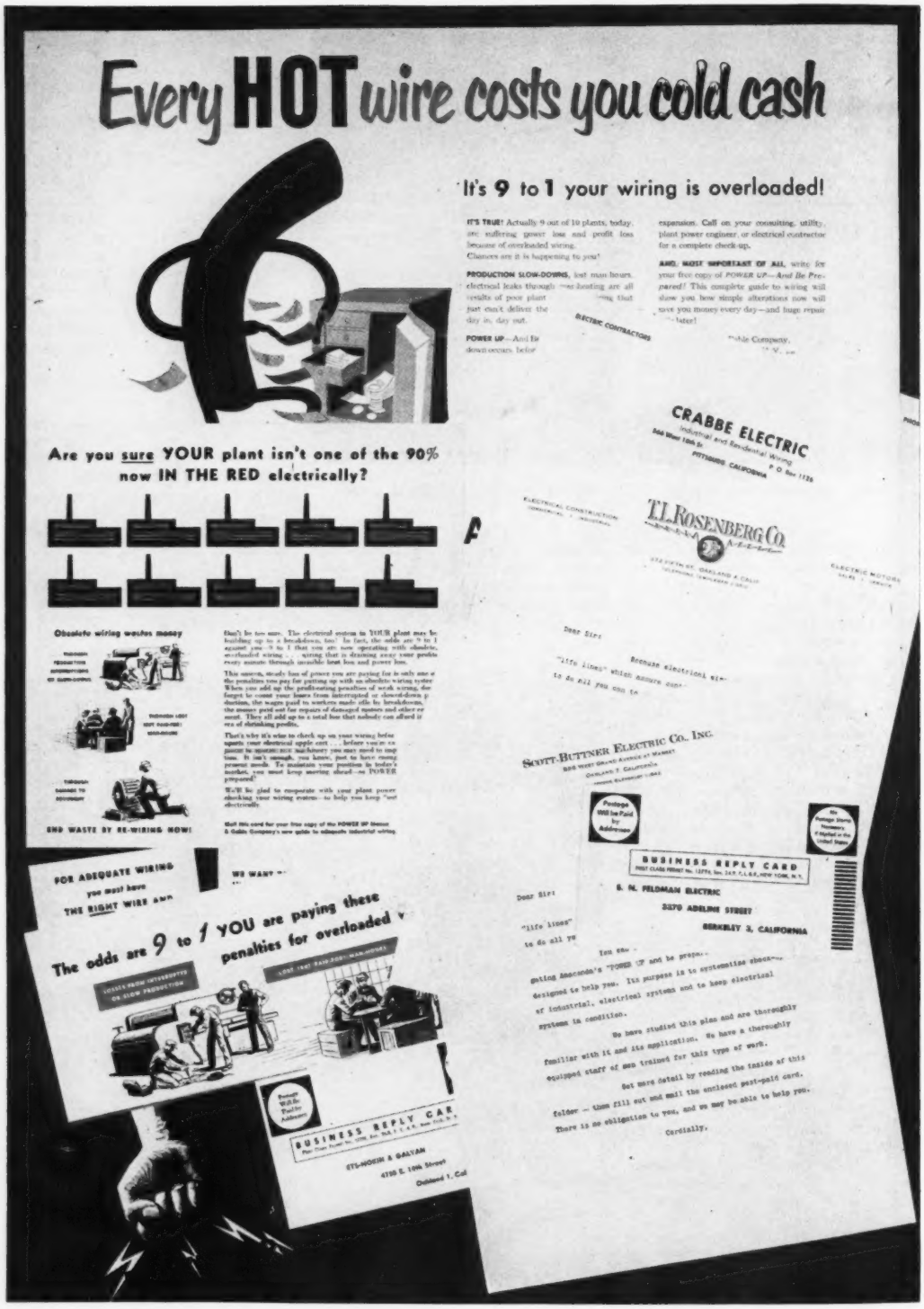
Two motors will be driven by one generator by means of a 4,300-amp isolated-phase bus extending from the power house up the face of Grand Coulee Dam to the pumping plant. This unusual bus was described in ELECTRICAL WEST for April 1951, p 68. The motors will be started usually as synchronous motors by energizing the fields of both generator and motors and bringing them up to speed together. They can be started also as induction motors by running an excited generator up to about 70% of normal speed and cutting off the water supply to the generator turbine before switching in the motors, with their fields not excited. As the slowing generator and the accelerating motors come into synchronism, motor fields are excited, and motors are then brought up to speed as synchronous motors.

The Columbia Basin Project, which includes the largest masonry dam in the world, the largest power plant in the world, and the largest pumping plant in the world, was designed and built and is operated by the Bureau of Reclamation.



Work Proceeds on Hungry Horse

Despite late snows in northwestern Montana, Hungry Horse Dam construction is expected to proceed on schedule. Major work planned this year includes placement of approximately 1,200,000 cu yd of concrete and construction of the 285,000-kw power house. Installation of four 105,000-hp turbines will be started this spring. Contract covering completion of the dam, power house and switchyard was awarded to Grafe, Shirley, Lane Co. of Los Angeles on a bid of $1,796,542. General-Shea-Morrison is prime contractor for the USBR project.


Every HOT wire costs you cold cash
It's 9 to 1 your wiring is overloaded!
IT'S TRUE! Actually 9 out of 10 plants, today, are suffering power loss and profit loss because of overloaded wiring.
Chances are it is happening to you!
PRODUCTION SLOW-DOWNS, lost man-hours, electrical leaks through ... overheating are all results of poor plant ... wiring that just can't deliver the ... day in, day out.
POWER UP—And fix ... down occurs, befor ... expansion. Call on your consulting, utility, plant power engineer, or electrical contractor for a complete check-up.
AND, MOST IMPORTANT OF ALL, write for your free copy of POWER UP—And Be Prepared! This complete guide to wiring will show you how simple alterations now will save you money every day—and huge repair ... later!
... Company,
Are you sure YOUR plant isn't one of the 90% now IN THE RED electrically?
CRABBE ELECTRIC
Industrial and Residential Wiring
PITTSBURG, CALIFORNIA
T. I. ROSENBERG CO.
Obsolete wiring wastes money
END WASTE BY RE-WIRING NOW!
Dear Sir:
"Life lines" which assure ... to do all you can to ...
SCOTT-BUTTNER ELECTRIC CO., INC.
Postage Will Be Paid by Addressee
BUSINESS REPLY CARD
S. N. FELDMAN ELECTRIC
2170 ADELINE STREET
BERKELEY 3, CALIFORNIA
FOR ADEQUATE WIRING you must have THE RIGHT WIRE AWG
WE WANT ...
The odds are 9 to 1 YOU are paying these penalties for overloaded ...
LOSS FROM INTERRUPTED OR SLOW PRODUCTION
LOST TIME PAID FOR—MAN-HOURS
Postage Will Be Paid by Addressee
BUSINESS REPLY CARD
STS-MOEHR & GALVAN
4700 E. 10th Street
Oakland 1, Cal
Dear Sir:
"Life lines" ... to do all yo ...
You can ... mating Anaconda's "POWER UP and be prepa... designed to help you. Its purpose is to systematize check-... of industrial, electrical systems and to keep electrical systems in condition.
We have studied this plan and are thoroughly familiar with it and its application. We have a thoroughly equipped staff of men trained for this type of work.
Get more detail by reading the inside of this folder — then fill out and mail the enclosed post-paid card. There is no obligation to you, and we may be able to help you.
Cordially,

Getting Results from "Power Up"

Western contractors who make use of Anaconda promotion program begin to find response from industrials

To the Northern California Chapter of NECA goes the distinction of being the first to get underway with a series of mailings to industrial prospects in the East Bay area of California, in cooperation with Anaconda's "Power Up and Be Prepared" campaign. The Northern California Chapter, under Manager Ernest Kramm, enlisted 14 contractors in Alameda County and Contra Costa County whose letterheads have been used for the first mailing and whose names are carried on the attractive publicity pieces for the second and third mailings, soon to come.

While the East Bay group has been the first to get ready and set in motion this promotional campaign for electrical contractors, activity is brewing in many other localities. Other groups of contractors throughout the West have heard the story from the Anaconda representatives or at any NECA or other contractor association gatherings. Most of them are in the process of signing up their members for participation in the program. After that is done the Wire & Cable Co. furnishes the printing and the contractors do the mailing to their own list of prospects and customers.

The program was made available to contractors first through addresses to NECA conventions by Fred Luna, sales promotion manager of Anaconda Wire & Cable Co. Since then it has been carried to groups in the Northwest by Lloyd Wolf, district manager Seattle; Lee Hayward in San Francisco, William Gaylord in Los Angeles, and by Anaconda representatives in Salt Lake City, Denver and Phoenix.

Hayward, in presenting it to San Francisco Bay Area contractors, pointed out that the program goes back over 13 years. It has entailed an expenditure of many hundreds of thousands of dollars, not to promote a type or brand of wire but rather an idea that has directly benefited the utility, the contractor, the wholesaler, and in many ways all of the wire and fittings manufacturers. The first of the series called "Industrial Modernization," pointed out that 9 out of 10 industrial plants were inadequately wired. When copper became strategic in World War II, the program was beamed along the lines of "Preventive Maintenance" and established the idea throughout the industry and American industry generally. After the war, it was realized that with the inability to secure materials to meet their needs, industries generally were in bad condition and needed modernization again. The campaign was then changed to "Wire Ahead" and more than 100,000 manuals were distributed. With the new emphasis on war defense preparation, the program now is aimed at "Power Up and Be Prepared" to tie in with the present situation.

The defense production administration has set up the machinery to enable essential industry to obtain critical materials under a maintenance, repair and operating supplies order No. 97. This is designed to give relief with small amounts of critical materials for repairs and operating supplies or to make for more efficient operation of a plant. The advertising material emphasizes these ideas and offers to the prospects and customers a free checkup of the wiring and motor installation in a plant by the electrical contractor to make sure that the most efficient use is made of power applications.

Beside the 14 contractors in the East Bay Chapter, 10 contractors, six of whom are located in Long Beach, have begun action along the same lines in southern California. Reports are not available as to progress in other sections of the West, although some action is taking place in most chapters of NECA. The program is not limited to the NECA but has been presented to independent contractor associations as well.

Likewise, the utilities throughout the West are being acquainted with the program and their power sales engineers and consultants are all equipped with the material in order to be able to talk the idea to their customers.

In some instances, the program has been presented to electrical workers' unions and has received enthusiastic response from them. One of these was Local 617, addressed by Hayward, after which plant engineer members of the union contacted the company for details of the checking list for the electrical installation.

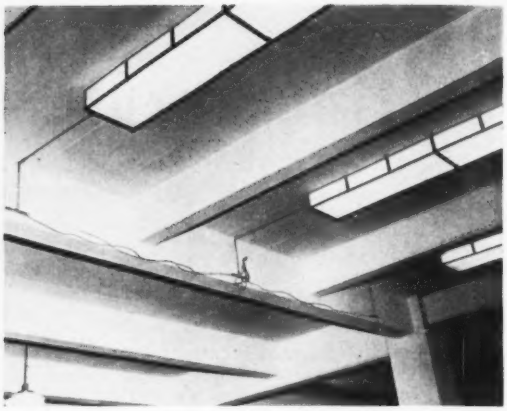
In order to prevent too much duplication of mailings, contractors in some chapters of NECA have submitted their list to the chapter manager and by mutual consent have eliminated some of the industrials from the list where there might be too many mailings to the same plant.

The plant wiring systems surveys are designed to disclose power wastes caused by overheating of overloaded circuits, excessive voltage drop resulting in slow-speed motor operation, poor illumination, poor physical conditions of cables and wiring that cause or threaten production interruption, low power factor, lack of capacity to permit expanding production by adding new equipment. The manual for use in consultation with the industrial plant covers management's responsibility, the electrical distribution system, electrical adequacy, then carries a number of tables and charts for appraising the power and lighting systems signals, system records, switchboard and feeder layouts, use of instruments, load surveys, voltage surveys, various kinds of tests and a wealth of information in charts and tables.

Results began coming in sooner than anyone expected in the East Bay area of San Francisco Bay. One Berkeley electrical contractor attributed three new jobs to the mailing he had made within two weeks of it. An Oakland contractor who had been working on an industrial prospect for some time believes the mailing helped him decide the prospect to go ahead. Others felt that the first mailing aroused interest and succeeding mailings would bring an invitation for a plant survey from many who have been awaiting defense orders before starting.

Facing page—
A spread of the mailing pieces, letters and return cards used in the Oakland region in launching the "Power Up" program there. Contractors own letterheads were prepared by Anaconda to mail to their own lists

Wells and Robinson drilling concrete beam for Wiremold installation. Note the studs in the ceiling driven by a Ramset gun



Fixtures in place but circuiting in Wiremold not completed. Molding was run in the edges of each bay for finished look

Before: Ornamental bowl-type incandescent units in one section

After: Same section relighted with fluorescent slimline units

Problems Solved in Building Rewiring

Some buildings are easier than others to rewire for higher levels of illumination. But a solid concrete one, without furred ceilings, presents quite a few problems.

Bruno Barth, proprietor of San Diego Electric Shop, faced such a problem for an old customer, Lion Clothing Co. of San Diego. The customer wanted to bring the levels of illumination up to modern standards, replacing the old incandescent bowl-type fixtures. He was particular that the appearance of the remodeling job be in conformity with the general neatness of the interior decoration itself. The fixtures must retain the dignity of the well-established firm, John Fox, its owner insisted.

Barth found the well-built structure to have adequate capacity. It was originally engineered by Holmes and Sanborn. Generally speaking, there was a center outlet for each bay. It was cast in the ceiling concrete whose finish was sufficiently smooth to use as a ceiling. However, the concrete was old and very hard and was found to be filled with hard rock. It was decided to use Wiremold metal molding for running the circuits from existing outlets to the new fluorescent fixtures. An attempt was made to use the Ramset powder tool to drive the studs into the concrete, both to hold the fixtures and metal molding.

A Mitchell Module 4-lamp slimline fixture weighs 80 lb and it was estimated that six studs would hold each fixture. The Ramset gun was used for this purpose. However, with the old and dry concrete, often large chips from the ceiling would be blasted away from around the stud giving a poor appearance. This was all right underneath the fixture but would not serve for the metal molding. Because of the hardness of the concrete, the studs would not penetrate deep enough through the molding to hold it without obstructing the molding itself for the passage of the circuit wires. Hence, for the molding the electricians had to hand-drill the concrete and to insert lead expanders into which to fasten the molding.

To give a finished appearance, the Wiremold was not skimped. It was run along the edge of the beam to carry it on as though it were a definite part of the structure, complete to the end of the beam.

Wiring was done with TW wire, each outlet feeding two besides itself.

In cases where the stud hit a rock when being driven by a Ramset gun, it was sometimes necessary to move

the location and try again. At such places, the new hole had to be cut in the fixture to support it from that replaced stud.

The pictures show David Wells and T. L. Robinson installing a Wiremold from Up-Right aluminum portable scaffold on casters. This scaffolding provides a work bench along the top. Spanning desks and counters, it permitted store operations to continue.

After installation, the ceiling was redecorated and the molding was scarcely visible. The new deluxe cool-white lamps were used in the fixtures to give a better color rendition to the fabrics and a warmer appearance to the store.

Low-Voltage Relay Control Circuits

At a recent meeting of the Southern California Chapter, IAEI, a report was adopted recommending the following rules for installation of low-voltage relay control circuits for lighting systems:

1. All secondary wiring shall be installed in a workmanlike manner. Wires shall not be run in exposed locations in such manner that they will be subject to mechanical injury. Wires shall be securely fastened in a suitable manner at least every 4½ ft and within 12 in. of each outlet and shall be installed under the same conditions as provided in the code for non-metallic wiring installations, except where other requirements are specifically mentioned in the following rules.

2. Secondary wiring shall have approved insulation for not less than 300 volts. No wire smaller than 18 AWG shall be used.

3. In figuring the size of boxes required, each relay shall be figured as requiring a minimum of three cubic inches in addition to the size needed for the number of wires in the box. If the relay is larger than three cubic inches, the size of the box shall be increased accordingly.

4. Low-voltage switches used to operate the relays shall be of approved type and shall be secured to a plaster ring or in approved box or by some other suitable means.

5. The relays shall be adequately fastened to the outlet box in which it is installed and in such a manner that it may readily be removed and reinstalled after the outlet box containing same is concealed without removing plaster or the finish of building.

6. If desired, relays in an approved box or cabinet may be placed in attic space where there is a minimum vertical clearance of three feet and walkways are provided. Where the space is less than three feet, relays shall be installed within one foot of scuttle.

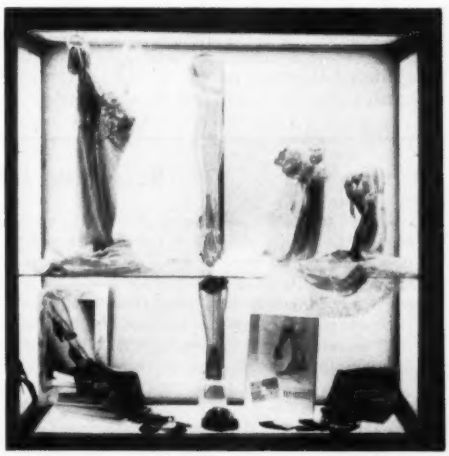
7. Where an approved assembly consisting of relay, transformer and converter and/or current limiting transformer is used, it may be installed in an attic where there is a minimum vertical clearance of three feet and walkway is provided. Where the clearance is less than three feet, such assembly and/or current limiting transformer shall be installed within one foot of scuttle.

8. Transformers which are not of the current limiting type and secondary fuses shall be located at the service entrance or in some other readily accessible location (not in attic space).

9. Relays shall not be installed in a fluorescent fixture or a recessed fixture unless such fixture is approved by some recognized testing laboratory with relays installed.

10. Where uninsulated staples are used to fasten low-voltage conductors in place, such uninsulated staples shall fasten a single conductor only. Where insulated staples are used, such staples may fasten or support more than one conductor. Other approved methods may be used to fasten conductors in place.

11. The low-voltage conductor may be installed in the same circuit or raceway with the other wires of the circuit when the low-voltage conductor has an insulation equal to the conductors of the circuit.



An exceptional example of planned lighting for enhancing sales is found in Scotty's, a women's apparel shop at Lewiston, Idaho, designed by H. Brant Gessel, Walla Walla architect. The installation presents a variety of techniques, each fitted to the particular area and merchandise to be displayed there. Where racks of women's apparel are placed at rear of store, a louverall ceiling gives general illumination. Above the 6x6x6 white painted quarter-inch plywood louvers are mounted 16 50-w, 3,500° K fluorescent lamps in two-lamp strips. Over counters and along walls to give a punch of down lighting, 100-w reflector flood lamps in louvered units are placed where appropriate. Over the handbag bar counter, 150-w down lights are used. The entire front is glass, giving a show window effect to the store. Along the window frontage bullet-shaped spots on swivel mountings direct illumination on specific items. General light f-c level is 55. Room is 47x81 with a 12-ft ceiling, finished in pastel rose, green

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION

Utilization Data Sheet No. 81

SUBJECT: Electric Steam Boiler
CUSTOMER: La Chapelle Cleaners, Seattle, Wash.
TYPE OF BUSINESS: Dry Cleaning and Pressing
SERVICE COMPANY: Puget Sound Power & Light Co.
DATA SHEET PREPARED BY: J. F. Flynn

Increased business necessitated steam producing capacity greater than that of an existing 3-boiler hp boiler in this dry cleaning plant. City fire laws prohibited flame-type boilers of greater than 3-boiler hp in the same building with a dry cleaning process. Also boilers larger than a 3-boiler hp must be operated by a licensed engineer. Costs of a larger flame-type boiler were considered exorbitant by the owner.

Electric Boiler

An electric steam boiler of 9.8-boiler-hp capacity to replace the existing boiler was the solution. This boiler, installed in the existing building, has a rating of 96 kw and operates on 230-v 3-phase. Steam output was increased 330%, while operating costs increased only 50%. The electric boiler is cleaner and quieter; there is no excessive heat and no fumes; no special skill is required, and installation cost was far below estimates as well as alternate types of boilers.

Approximately 1,000 orders are written up per month. These are designated as work slips. The number of garments on each slip can not be determined, but there is an average of 40 work slips handled per day. Formerly all cleaning was sent out to a wholesale plant and only enough steam was produced for pressing. Now both cleaning and pressing are done in the company's own plant. The operation has so changed that it is impossible to get comparative costs on a work slip basis.

Electric steam boiler of 97-kw capacity replaces fuel-fired boiler in dry cleaning plant. Steam production increased 330% with an increase in operating costs of only 50%

Operating Data

Work week, 6 days, 8 hr per day

Connected load	96 kw
Average kwh per month	8,000
Average kwh per work slip	8
Average monthly kwh cost	$75.00
Average cost per work slip	0.075

Considering the cleanliness, installation and operating costs, the owner states that he would not hesitate to recommend this type of installation to other cleaning and pressing establishments.

Resistance Heating of Fluid Pipe Lines

Direct resistance heating of pipes that carry viscous liquids can be the solution to many industrial processes, points out W. D. Howell, Pacific Gas and Electric Co., Oakland, Calif. Sales potential for long-time fluid transportation is tremendous, says Howell. By passing 60-cycle current through the walls of the pipe under controlled conditions at low voltage, fluid temperature can be maintained within close limits over any distance.

Such fluids as molasses, asphalt, grease, wax, lubricating oils, molten lead, chocolate, resin paint, heavy bunker fuel oil and numerous other lesser known and special liquids readily lend themselves to this type of direct electric heating of the flowline. By this method, high pressure steam can be kept dry until it reaches its point of use; water can be delivered from a well to a barn without freezing, and air can be sterilized at 1,300°.

There are numerous special applications. This method of heating is used by American Can to transport paraffin to coat milk containers; Seymour Grain Co. to spray molasses on cattle feed; Western Wax Paper Co. for conveying melted paraffin; Judson Steel Co. to lower viscosity of bunker fuel oil for open hearth operations; General Cable Co. for conveying molten lead from melting pots to the point where the sheath is applied to the cable; U. S. L. Battery Co. for handling battery compounds. Numerous other applications could be cited.

In general, the application involves, by use of transformers, the passing of regular 60-cycle current through the walls of pipe lines conducting viscous fluids. By this means the entire pipe becomes an integrated heating unit and temperature of the fluid is automatically maintained by thermostatic control under all conditions of flow, from stand by to shut-down. Low installation cost, low operating cost and solution of a difficult problem are bringing about widespread use of direct resistance heating of pipe lines.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Wire we so?

Wholesaler stocks of many items are piling up high, whereas their copper wire shelves are bare—and we don't mean conductors. Contractors, on the other hand, are often fat on wire, having cleaned the distributors when they sensed a scarcity coming.

Only the fit

One wholesaler told the inspectors meeting that about 10% of the contractors have folded their tents and gone to work for other contractors or into defense work at high pay. This has thrown to other contractors who bought their stocks a sizable inventory of wiring materials.

Is it atomic?

High wage scales negotiated for the Arco atomic project where the big generals are willing to pass it on to Uncle Sam have played hob with civilian work around Idaho Falls and Pocatello. Much of residential work is now done non-union as it has been in Salt Lake area for some time.

Momentum still

Building activity has been riding the tail of prefreeze starts and only in some areas has it made a noticeable slowdown, mostly in the Northwest. Although some contractors have made pleas of shortages in order to substitute, inspectors have found on investigation that suppliers still had most everything that was standard.

Serious sessions

Two NECA district meetings were held in April—District 5 at Phoenix, April 23-25; District 6 at Sacramento, the 27-28. From NECA staff came Paul Geary, executive vice-president; George Roscoe, public relations director; Al Cornish, director of research and education. George Seaman, doubling as District 5 director and Line Constructors Section director, also attended both. The Arizona meeting was a joint one with District 7 of IBEW, with W. L. Ingram, international vice-president. (More detailed accounts of both meetings next month.)

Quick look

Some highlights from both meetings: Recent NLRB decision to require elections for union shop but not closed shop selection is causing concern and some area or even national election plans may be tried . . . Area line agreements particularly should be reached before such Taft-Hartley elections. Jurisdiction between unions still is a major problem on big jobs. IBEW wants telephone line work, too. It may give men to generals in order to establish jurisdiction, which means more to it than electrical contractors at present. Most managers of chapters reported a shift to fringe demands, even welfare deals, to circumvent wage freeze . . . Pension program isn't bringing in enough for the increasing number of pensioners, so IBEW has increased monthly payment from members . . . NECA dues committee recommends $50 minimum but reduction from .03 to .025% on labor pay roll. Has to be ratified at convention in Washington in the fall.

New president

Popular Ed Vanderlinde of Rochester, N. Y., died suddenly March 24. He presided at last year's Los Angeles national convention, was supported by most Western chapters when elected. The administrative committee selected Erne E. Carlson, of Youngstown, to fill his unexpired term. He has headed the NECA labor relations committee and IBEW employers section.

Don't fence 'em

Salt Lake City is still having ordinance trouble. Last month Mayor Glade sought to unsnarl the tangle by appointing a committee representing 15 groups. It grew to 23 groups, and still was not approved at month's end. With so controversial a city ordinance, a proposed county ordinance was running into opposition from rugged citizens wanting no more regulation. Protests were made by everybody from chinchilla raisers to cranks.

Substitutes for "

Insulation material shortages may not be confined to rubber. Many of the thermoplastics and neoprene take chemicals that are wanted for other defense purposes. Ingenuity of the wire people will again be taxed to develop acceptable substitutes from what's left.

Lots more aluminum

That aluminum may be forced to take the place of copper for nearly all wire sizes except small building and magnet wires was the hint carried in a talk by Clint Hurd, of NPA, Washington, D. C., to utilities groups. Certainly all outside conductors and large-size wires and cables will go to the light metal. Some building wire may be made from scrap. Even the weather-proofing may go from line conductors to save insulation.

Materials control

CMP goes into effect in July. It may be some help, but don't be too hopeful that it will solve all problems. With it a rated project will give the contractor a channel through which to seek all materials necessary to fill that contract. It will extend all the way back even to the materials to fabricate fittings and panels, we are told.

Gas proof wire

After yearning for a gasoline-proof wire for years for service station and oil yard installations, and G-E's answer was a nylon jacketed TW wire called Geoprene, now the supply of it seems to be in doubt. For one thing G-E has gone out of the building wire manufacture for the duration, and getting nylon is another.

Standardize instead

Nobody had any new devices to show the inspector meetings in the Mountain States last month, an unusual situation. Simplification, if anything, seems to be in the wind, with fewer all-purpose products instead of special designs for specific applications. One manufacturer spokesman said it was likely that even cheap competitive lines of fittings would be cut back or eliminated and manufacture concentrated on quality lines.

A real prize

To show how values change, the door prize given at a drawing among only the contractors present at the Idaho Chapter, IAEI, was a coil of two No. 12 conductor non-metalic sheathed cable. Even this was cut into one 500-ft. and two 250-ft. lengths to spread the benefaction to more contractors.

Melting freeze

Wage rates in Salt Lake City and Stockton went to $2.75 an hour. There was no struggle. In Salt Lake nearby Dugway weapons testing grounds, being rushed to completion in one year instead of three, promises to keep all building trade workers busy for at least a year even if the new scale discourages other civilian work and defaults home wiring to non-union. Pocatello scale went from $2.25 to 2.365 as the Arco rate went to $2.75. Idaho Falls had a $2.15 scale, was offered $2.25 which the union refused, now under the freeze all they can get is $2.20. Pocatello local may take Idaho Falls over in order to give them its own rate.

In a tube

A new type wire, whose idea comes from France, was just about to be put on the market by one manufacturer who asked for NE Code approval. Called MI wire, a magnesium oxide paste is put over the live conductor which is drawn in a seamless copper tube and compressed, much like a Calrod element. It is really a concentric wire, the outside being used as ground. Advantages are its ease in making sharp bends and resistance to blows. But it does use more copper and hence may be slow to be produced.

Uprated

J. G. Maechtlen, Los Angeles, Western sales manager of Square D, was made a vice-president of that company, associated with Joe Pengilly.

Powder death

California courts have awarded a death claim to the family of a neon sign tube bender whose long illness and death were determined to have been caused by breathing beryllium powder used in the tube coating.

Expands

Standard Electric Supply Co., started 18 months ago by W. R. "Bud" Edwards in Berkeley, moved to a new office and warehouse at 689 26th St. in Oakland, May 1. Edwards says he has grown by concentrating on contractor trade only, not selling to industrials.

Safer service

National Electric Products Co. won the Lewis & Conger Home Safety Award for 1951 for its new grounding Plug-In strip, as a product that "will best prevent a common cause of accidents in the home." Judges found that the grounding plug-in strip provides not only a completely grounded wiring system which reduces fire, life and casualty hazards but also carries a convenient spread of electric receptacles.

Open house

Tubbs Electric Co. of Spokane celebrated its fifth anniversary in business as an electrical distributor in the Inland Empire area by an open house, May 1-2. C. A. Tubbs, president, says the firm has grown from two to 31 employees, 4,000 to 26,000 sq ft of floor space and has done business of $5,000,000 in five years. It handles both wiring supplies and appliance lines.

Audience at home economics demonstration and show during AMA Food Freezer Fair at Phoenix. Below: committee for the April promotion for evaporative and refrigerated coolers meets to discuss the AMA advertising program. Left to right: Tommy Thompson, dealer; Chairman Adam Goettl; Paul Johnson, distributor; Glen Jones, distributor; Pete Henscheid, dealer

ARIZONANS UNFREEZE

Nearly 7,500 people attended the first annual Food Freezer Fair held as one of the first industry-wide promotions by the Appliance Merchandisers Assn. of Phoenix. Working against odds — the three-day event opened on Good Friday and closed on Easter Sunday—the association combined a bathing beauty contest and the appeal of frozen food demonstrations by Calapco home economists to bring satisfactory attendance for its 27 exhibitors who had rented space at Phoenix' Shrine auditorium.

Under the direction of AMA secretary-manager, Jack Canady, nearly every medium of promotion was used in the weeks previous to bring attention to the show. Participating manufacturers selected a girl to represent each company in the beauty contest; three afternoon TV shows utilized the girls on the programs; spot announcements were used over each local radio station and newsstories with girl pictures were used in the daily newspapers. A 32-page special edition of the Phoenix *Sun*, a weekly newspaper, was issued the opening day of the freezer fair with every bit of space devoted to stories on frozen foods and using home freezers, plus advertising by both dealers and manufacturers.

During the three days, 12 demonstrations on the use of frozen foods were made on the stage of the auditorium by Calapco home service girls under the direction of Ruth Kruger. On opening day, a committee of two sailors, a soldier, a professional model, and two members of AMA selected Miss General Electric to be "Miss Food Freezer of 1951." On Easter Sunday, a fashion show, plus the presentation by a big, live, pink Easter Bunny of a baby chick to each child accompanied by parents, brought attendance to 2,500. During the three days, Canady MC'd entertainment programs that included dancers, accordionists, as well as singers and Western music.

Reports from the manufacturers participating indicated that more than 100 freezers were sold during the show and during the few days following. Public interest in financing a freezer and food together was high, with a bank exhibitor claiming that it closed enough contracts to more than pay for the space.

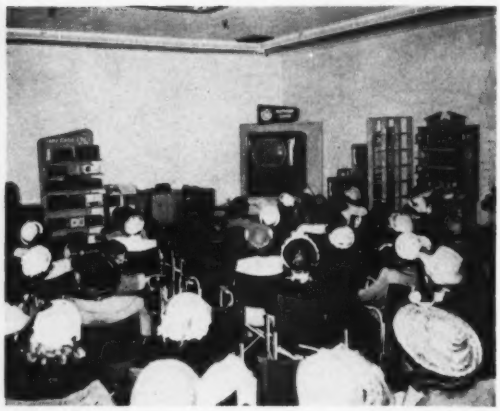
Added attraction was the daily drawing for a home freezer. The winning contestant drew a brand name from a hat, and AMA paid the distributor for the freezer.

Next promotion by AMA is to be one on evaporative and refrigerated coolers, for which the season is starting in Arizona. The committee for this promotion consisted of Tommy Thompson, chairman, a dealer; Adam Goettl; Paul Johnson, distributor; Glen Jones, distributor, and Pete Henscheid, a dealer. Slogan is "Cooler Weather Ahead."

● **That the home goods industry** will get more than its share of the consumer dollar if it goes after it was the prediction of Maury L. Nee, P. J. Nee Co., Washington, D. C., chairman of board of directors NRFA, chairman retail planning committee, who spoke at the Furniture Mart in San Francisco last month. Only 20% of the steel producing capacity of the country would be touched on a $70 billion defense budget, and so there is going to be steel for appliances, he said. More and better advertising is needed, however, he believes.

E. H. Taylor (left), Hotpoint general sales manager, congratulates Don Willis, Central Arizona Light & Power Co., Phoenix, who accepted for his company the George A. Hughes award for outstanding educational program to broaden markets and increase dealer sales of electric dishwashers. Sponsored by Hotpoint, the awards are presented annually by Edison Electric Institute

Loris Knoll, International Harvester, demonstrates home freezer



Edith Green show telecast. Mrs. Cleo Filsinger on extreme left

Demonstration Techniques in Action

How to sell while demonstrating electric equipment was ably shown by experts at the PCEA Equipment Workshop, sponsored by the home economics committee at the G-E Supply Co. auditorium in Emeryville, April 19 and 20. About 75 home service women, demonstrators and teachers attended the sessions, which were planned by Lois Ferris, Westinghouse, chairman of the home economics committee, and Marguerite Fenner, Pacific Gas and Electric Co.

A similar demonstration technique workshop will be put on May 17 and 18 at Santa Monica, with Pauline Eliker, Edison Co., as chairman.

Selling techniques, preparation short cuts, hints on staging, timing, dress were brought out by several of the speakers. Also stressed several times was the importance of persuading the appliance owner to read her instruction book.

Effectiveness of pastel color in dress, of harmonizing colors in dishes and other "props," importance of bowls that are transparent for easy seeing and unbreakable for easy packing; how orderly arrangement of ingredients and bowls and dishes can save time; benefits of determining purpose and planning show in advance; use of a mirror to aid the audience in seeing the demonstration; methods of working without turning one's back to the audience were shown.

Pointing out that demonstrations are often staged under difficulties and that it is not safe to assume that water, outlets, utensils, gadgets and other necessities will be available, Patricia Murtaugh, Dole Co., advised "casing the joint" in advance and taking along what was needed. Her talk on the "how's" of giving a demonstration was filled with practical hints.

How an electric range is put together for rigidity and perfect fit was demonstrated on an actual range body by R. F. MacGillvray, Westinghouse Electric Corp.

In "Don't Blame It On Your Oven," Mrs. Maxine Gentis, PG and E, told how the condition of pans affects baking.

In a demonstration that gave the audience useful knowledge about the range, while at all times effectively selling electric cooking, Lois Ferris proved the point that advance preparation pays by starting late and catching up to finish on time.

Selection, preparation and packaging are key words in freezing, according to Loris Knoll, International Harvester Co., who showed how to demonstrate a home freezer within the time allotted for cooking schools. She also advised demonstrators of other equipment to save time by using a home freezer.

Lois Ferris tells about "Watts Cooking"

In a morning given over to washing and ironing, Jean Warren, head of the UC home economics division, discussed soaps and syndets; Molly Sylvester, Frigidaire, gave highlights on the automatic washer and dryer.

In the "1-2-3-4's of Mechanical Ironing," Mrs. Elva Clark, Arthur C. Maryon Co., advised the paper pattern approach; said that if women would learn that every garment is made up of straight pieces, the ironing process would be simplified. Following through on this idea were Marcia Meade, Leo J. Meyberg Co., on under-the-roll ironer techniques, and Mrs. Hazel Dederman, G-E Supply, on flatplate ironer techniques.

Mrs. Cleo Filsinger, PG and E home economist, cited similarities and differences between TV demonstration and live audience shows. She discussed timing, techniques and mental approach; pointed out that the demonstrator was constantly under direction, had more detail to watch; that a different audience approach, a more informal voice technique and willingness to change were required. How to give the commercial, determining purpose, planning show, taking care of the unexpected, clothes and make up, commonly accepted signals, scripts—all were discussed.

Mrs. Filsinger's points were illustrated following her talk by a telecast of the Edith Green show over KRON-TV.

A demonstration of electric housewares, or small appliances, by Marjorie Harper, G-E, concluded the program.

ELECTRICAL WEST

Sales Guide

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

May 1951

Appliance sales certainly took a nose dive throughout the West in April. In some cases dealers who've been in business 20 years said they'd never seen anything as slow. Totalling the number of sales, however, things didn't look as blue as they said it was, although by comparison with good months it was slow and customers were slow to decide and slow to pay on open accounts. Distributors were pounding their backs to "get out and sell, go back to good old doorbell pushing."

The dive

Certainly there seemed to be plenty of inventory of most everything. Factories continued to ship at almost 1948 rate, loading warehouses and dealer floors. Noticeable only was absence of lookers among the appliance displays. But all retail trade was in the same slump.

Fat with stock

Credit restrictions were blamed for conditions. Customers loaded with heavy rent and home payments or new car payments had little left after eating and taxes to make substantial down payments or short term monthly payments. They are asking Federal Reserve to have a heart. So are associations and manufacturers of TV.

Overhead but no intake

Some dumping has occurred as Los Angeles stocks were unloaded in Salt Lake and Denver areas advertised as "damaged in shipment." But even cut prices didn't sell. All they did was to make the public more cagey waiting for even bigger bargains. The eager buyers had already bought.

Slashing no cure

Fixture business was almost the same. Noticeable is the amount of wiring materials being sold for self-installation. Fixtures too. High labor rates drive the public to doing things themselves. Home workshop tools like Shop-Smith have sold in quantities in Montana rural areas, says distributor Bob McDonough, Monitor Appliances. So have Monitor's little low-priced washer. Doesn't take a big down payment.

Roll their own

Timed well to counter the slump, Ogden Chapter, Intermountain Electrical Assn. staged a really big time All Electric Exposition (its second annual) at White City Ballroom, April 25-26. Drew crowds to afternoon cooking schools by Evelyn Hansen, Utah Power & Light home service director, and Dr. Ethelyn Greaves, dean of home economics at Utah State Agricultural College, Logan. Evenings had local talent musical shows as feature attractions. Colorful exhibits by distributors and dealers surrounded the hall. (Pictures and details in a later issue.)

Counter attack

J. I. McMahon, founder of the chain of 65 McMahan Furniture stores, died when returning from a National Retail Furniture Assn. meeting, April 4.

Fountainhead

By now you've either made out your complicated price list for OPS or are buried in it. Time has been extended to May 30 to file. It is too long to cover here and deserves careful study as you must make a choice whether to file under CPR 7 or stay under the GPR. More overhead!

Less margin

Market week in San Francisco at Western Merchandise Mart is July 16-20. It will have its customary Radio-Television and Appliance trade dinner Wed. July 18 with nationally prominent speakers. The fall merchandise availability situation may have jelled enough by then to be significant.

Mart date

Gift, toy, jewelry, stationery and housewares shows in San Francisco, Portland and Seattle have been announced by Kay Leber: San Francisco, Civic Auditorium, Mart and Palace, Aug. 5-9; Seattle, New Washington and Olympic, Aug. 19-23; Portland Hotel, Aug. 26-29.

Shows too

Casper, Wyo., dealers decided to cancel the fourth annual Home Show this year. It was scheduled for April 20-22, at the Armory and was to be sponsored by the radio station.

Not now

V. E. "Sam" Vining, spectacular Westinghouse Electric Corp. saleman speaker was scheduled to be the featured attraction both in Spokane and Phoenix. He appeared April 30 at the Appliance Merchandisers Assn. general membership meeting in Phoenix. He is due to address the Inland Empire Electrical Dealers Assn. in Spokane, May 11.

Red suspenders

Inland Empire EDA now offers its members and their employees and families a group health and accident insurance plan at a very low cost. Dealers may either carry the cost or share it with employees or employees may carry it all themselves. This organization is readying its June freezer and refrigeration promotion. The range program went quite well despite an evident boycott by the four big distributors who are playing hard to get. But their lines need promotion, too, in a slack season.

Coverage

Electric League of Los Angeles has a dozen activities going. Its television group met to plan an industry-wide promotion around the theme, "Sell the Show." The lighting division is presenting to IES a plan to reach residential lighting customers with some good educational information. The league tied in with NEMA's Electric Housewares Gift Campaign. There's to be an industry-wide dinner meeting June 5.

Three rings

Appliance Merchandisers Assn. of Arizona is hot at its cooler promotion with three of the largest evaporative cooler manufacturers participating with a lot of time and space. Results from the Food Freezer Fair now appear to be nearer 200 sold than first estimate of 100.

Freeze to cool

Northern California Electrical Bureau decided like Farragut, to "Damn the torpedoes! Go ahead!" with its All Electric Exposition in early September and has appointed a flock of committees to begin the job.

Man the guns

Besides the Ogden exposition, Intermountain Electrical Assn. has held chapter meetings, the most significant of which was at Provo where Ernest Salerno, chapter president, reported many violations of Utah's Fair Trade law in granting of special discounts to steel company employee and similar organizations. Also much abuse by the public of free TV set trials. Central IEA was vigilant over Salt Lake City ordinance and was preparing a promotion with NEMA's Electrical Housewares Gifts.

On many fronts

Servel Inc. moves its West Coast regional office from Russ Building, San Francisco, to 1122 Wilshire Blvd., Los Angeles, says Seward Abbott.

Moves south

Preliminary reports from San Diego indicate that the Bureau of Home Appliances Spring Fair of Frozen Foods and Refrigeration was a big success again. Pictures and story next issue. Electric housewares were next in line for promotion from May 15 to June 15. Big TV meeting April 17 set the industry off on a sales and training campaign. — Faster sales

Low use customers, those with less than 100 kwh per month, farms with less than 200, are the target of a Westinghouse range activity of Idaho Power Co. Where a dealer is active with a prospect the sale is his. Where none are interested Idaho Power men make it. Runs from April 16 to July 16. . For kwh increases per customer in residential, farm and commercial classes, the sales department is competing for the T. E. Roach business development awards which will give high men a trip to Chicago, one to Sun Valley, clothes, cash prizes. Now in 4th month, it has monthly prizes on a blind bogey for the most outstanding job. — Uplift

Twin Falls had a Home Demonstration Week, begun April 30. Idaho Power and county home economists put on a show and dealers and utility had appliance and lighting exhibits around the hall. Now with four home service girls on its staff, Idaho Power is active in rural cooking schools and the girls also make home calls on dealer range sales. — Demonstrate

Although Montana Power's unique farm appliance sales program last year sold one out of every six eligible farms a major appliance (range, water heater, dryer, freezer or water system) it will not be repeated this year, says D. J. McGonigle, sales manager. Sales of specific appliances to listed and qualified farm customers by a dealer brought a bonus from the power company, some dealers doing a big job. However, a sales program is in the making for 1952, says Dee. — Farmers bought

Ray Thomas Co., Los Angeles, has been appointed exclusive distributor in southern California for Apex washers, automatics, ironers, dryers, dishwashers, cleaners and garbage disposers. The line was formerly distributed by J. N. Ceazan Co., which now will handle Crosley exclusively. — Change lines

Mitchell Mfg. Co., Chicago, which recently branched out from fluorescent lighting fixtures into radio, television and now air conditioning, has appointed F. B. Connelly Co. to distribute its line of window type air conditioners in Portland and Seattle; Prudential Distributors Inc. in Spokane, and Glenn Earl Inc. in Salt Lake City. The line includes four models, from 1/3 to 1 hp with Dyna-Cooler refrigerant system, Turbo-Dryer to dehumidify, Air Scoop to diffuse the air and filter screens to eliminate dust and pollen. In its radio line are new portable and table model radios of striking design and two low-priced console type TV sets with 17-in. rectangular tubes. — Air and TV

Winners—Rubenstein Furniture Co. of Eugene, Ore., was presented first prize award for an outstanding Hamilton dryer window display by F. B. Connelly Co. at a meeting in Eugene. . Henry Carlton, Yakima, won second prize in a G-E automatic blanket contest national. . Bill Harrison, sales manager, general appliance division, Sues, Young & Brown, Los Angeles, received the annual Vornado sales trophy from Earl Renfro, Vornado Corp. Bill Kuhn, of Easy, won a merit award too. — Honors, rewards

Rumor has it that Bert Reynolds, merchandise manager, General Electric Supply Co., San Francisco, may be made manager of the Oakland branch upon the retirement of Gene Garcia. G-E Supply, also is said to be dividing its appliance department into two parts, one for major and the other for traffic or houseware appliances as G-E itself has done. — Not yet official

Scanning TV picture

Unpredictable CBS reduced radio rates and has bought Hytron, maker of tubes, which owns Air King Products, so it's possible it may go into set making. . Crosley answers Zenith's big ads boasting that its sets only can take the new UHF channels with a tuner that will convert Crosley sets for less than $50. . Others also dispute such claims, saying replacing coils for non-usable bands with those for UHF bands in that locality is a minor trick. . Varian Associates at San Carlos is developing UHF transmitting tubes for G-E. . RTMA has asked FTC for a trade practice conference for the TV receiver industry to set up advertising standards, selling ethics. . Tele-King is rushing a new factory at 239 Central Ave., Los Angeles. . Tele-Tone is making a cabinet in which tube size can be increased. . Mexico City will soon have two transmitters and Packard Bell foresees a good market there for Los Angeles made TV sets. . A proposed excise tax increase to 25% on TV drew telegrams and letters of protest from all over the nation; may not be invoked. RTMA and others also trying to get Reg. W. change to permit trade-in to be applied on down payment. . RTMA and Better Business Bureaus are working on a program to assure an adequate supply of replacement parts for set servicing. . Emerson, Magnavox, Majestic cut prices on some models of their TV lines and Admiral gives away a three-way automatic phonograph attachment. . Walt Stickel, now national sales manager, DuMont, held a distributors meeting at Colorado Springs to get their ideas on distribution policy. Jack Smith, Quality TV Corp., Los Angeles, was far West man on the panel. . Ray Thomas Co. suggests selling TV sets to various service shops to quiet restless waiting customers.

Full scale program

Hotpoint has reduced the number of top models of electric ranges by introducing a new automatic pushbutton model that retails for $50 less than previous models in that class. Introduced at meetings in Seattle, San Francisco and Los Angeles Hotpoint's program is designed to help dealers dispose of heavy inventory. It includes a trade-in manual for guidance in setting up a certified guarantee program, a May and June all-electric kitchen and home laundry campaign, with a "lock and key" contest, new demonstrations, etc., constructing 100 model all-electric houses, an open-house campaign on refrigerators, kitchen and laundry planning, kitchen modernization and many other helps, says Howard Scaife.

Dual

A picture that radiates heat is a new development of Electrofilm Corp. of North Hollywood. Can be hung on a wall, or used on a base.

On commercial too

Its commercial cooking equipment fits particularly into the defense program, so Hotpoint will hold some 4-day commercial sales clinics to furnish sales training, offer a plan of operation to fit the times, interpret the rules and priorities related to the defense program. These will be held at Hotpoint Plant 7, Chicago, beginning May 14 and on through the summer and fall. . Added to the line of counter equipment of matched design is a low-cost controlled humidity roll warmer.

For light conditioning

Moe Light, Inc., Fort Atkinson, Wis., has developed a valance which will contain a slimline deluxe fluorescent lamp, in three basic units, 24, 33 and 48 lengths, which can be combined for longer windows. Each can be installed easily, is served by an extension cord, has traverse rods built in for draperies if desired and has panels in which the drapery or wall paper in the room may be inserted, or translucent panels used. Made of light steel, they are strong.

Live

Telechron announces a new kitchen clock, Ivy, with twin plant containers to hold growing vines. Is also featuring its color line of kitchen time pieces.

C. T. HURD NORTHROP HOFFMAN SCHULTZ CAMPBELL NELSON

License Non-Federal Projects Public Power Group Asks FPC

Need for speedy action in licensing a number of proposed non-federal projects in the Northwest to help relieve the critical power situation there was stressed at the spring meeting of the Northwest Public Power Assn. held in Wenatchee, Wash., April 12-14. C. A. Erdahl, Tacoma City Light and Jack Stevens, Bonneville Power Administration, detailed the gravity of the Northwest power situation, with more and more commitments being made for defense loads. Even with median or average water conditions this coming winter there will be a shortage of 250,000 kw peaking capacity and 150,000 kw energy, said Erdahl. For 1952-53 this estimated deficit will be 390,000 kw peak and 60,000 kw energy. For critical water the deficits range from 420,000 kw peak and 590,000 kw energy in '51-'52; 410,000 kw peak and 645,000 kw energy in '52-'53 to 105,000 kw peak and 605,000 kw energy in '53-'54. Erdahl, Stevens and others pointed out that these non-federal projects totaling about a million kilowatts could be built in a relatively short time and would materially relieve the situation if licensed by FPC immediately.

The materials problems also was of concern to the group. C. T. Hurd, DEPA, made a special trip from Washington to appear on the program. He said that the copper situation is worsening and that utilities will have to look to greater use of aluminum for conductor material. A bit of encouraging information was that DEPA is attempting to get blanket assistance from NPA to carry on major power projects.

Meeting for the first time with the general group, the accounting section was given a full day to discuss its problems. Budgeting in all its aspects was discussed by panel and individual speakers. Since there were a large number of public utility district commissioners present, an excellent opportunity was afforded them to become more familiar with the accounting and financial problems of the business.

European electric utility practices were discussed by Lloyd Morgan, Pacific Oerlikon Co. One of the interesting observations he made was that 230 v is now used almost exclusively in Switzerland for domestic service. Lights and appliances all operate at 230 v satisfactorily. Motor service is 230/380 v. He mentioned also that work is being done in off-peak control of water heaters.

The Chief Joseph project on the Columbia below Grand Coulee was interestingly described by Lt. Col. John P. Buehler, Corps of Engineers. The cofferdam has just been closed and satisfactory progress is being made on this project of 1,728,000 kw ultimate capacity. Ten of the ultimate twenty-seven 64,000-kw generators driven by 100,000-hp turbines operating under a head of 165 ft are under contract. First unit is scheduled for December 1955. H. A. Parker, Bureau of Reclamation, described the Columbia Basin project in interesting fashion. The first of six 65,000-hp pumps at Grand Coulee pumping plant is expected to go into operation May 12. By the spring of 1952, 87,000 acres of the initial 500,000-acre project will be brought under irrigation.

Highlights of the meeting were a panel on wholesale power rate trends conducted by P. C. Spowart, Seattle City Light, and one on elements of utility planning under Sol Schultz, BPA. The former gave Dr. William Dittmer, BPA, an opportunity to clarify many points in connection with Bonneville wholesale rates. He explained why ratchet clauses are in rates and dwelt on justification of the "formula" by which demand is computed on purchasers having some generation of their own.

In the panel on planning, E. R. Hoffman, Seattle City Light, said the utility is planning on a load density of 6,000 kva per square mile and an ultimate load in Seattle of a million kilowatts. R. W. Beck, consultant, pointed out the importance of financing in formulating present and future system plans. I. W. Best, Allis-Chalmers, said that standardization of design is an important element to users and manufacturers alike in system planning. Long-range planning will result in use of more standardized equipment and less special apparatus at a benefit in cost. A preventive maintenance program is also an essential element in system planning, he said. Schultz cautioned that there should be a proper balance between short- and long-range planning consistent with financing. BPA's fight that led the industry to the up-grading of insulation levels will result in savings of hundreds of thousands of dollars in transmission construction, he said. Spacings and insulation values used for 230 kv in the past by BPA will now be used for 300 kv.

Resolutions included one opposing the building of the controversial Oregon-California intertie by the Bureau of Reclamation. Owen Hurd, Benton County PUD, was elected president, and V. B. Jones, engineer, Tacoma City Light, vice-president, to take office following the Missoula meeting in September.

ELECTRICAL WEST

Northwest Power Priorities

OBJECTIONS are increasing throughout the Pacific Northwest to the Bonneville Power Administration policy of committing more and more of the BPA system capacity to so-called defense power loads. With restrictions now imposed on new industrial loads of 500 kw or more by virtually every utility in the region, BPA continues to solicit and sign up huge blocks of electrochemical or electrometallurgical load. The key sales argument is low cost—2 to 3 mills per kwh, depending upon load factor.

Even though the Pacific Northwest will remain a critical power area as far into the future as 1954, BPA has contracted for or is negotiating for 650,000 kw of so-called "indispensable" industry—a 67% increase in this load classification. The expected total of this type of load might exceed 1,550,000 kw by the end of 1954. Yet a critical water year in 1951 could leave the area short of 500,000 kw or more of sufficient capacity to meet normal demand. This same situation will be true of 1952 and 1953.

Utilities are critical of this policy because, they insist, it violates the preference clause of the original BPA Act. Public power agencies were given priority in that legislation. BPA has given second priority to industry and the private power utilities have taken the leavings, if any. The utilities feel that they should precede industry in the BPA power allocations. Failure to grant such preference discriminates against the bulk of the customers and the public, they insist with considerable justification.

Recently industry in both Washington and Oregon has objected to the BPA policy on the grounds that large power-consuming chemical or metallurgical plants contribute little in terms of pay rolls or local purchases. Most of the output of such installations is shipped out of the region for fabrication or processing. Industry contends that the power would contribute more to the economy of the region if it was parceled out in small blocks to new pay roll-producing businesses.

Finally, there are those who feel that all of the BPA talk about expanding capacity to serve potential defense industry is but propaganda typed and timed to influence Congressional appropriations for more and larger power installations. On that score there can be little argument. It is a fact.

However, none of this alters the fact that there must some day be a fundamental policy declaration relative to BPA power disposal. Until that time there will continue to be confusion and argument and a constant threat of discrimination. The whole matter may be resolved in 1951. It will be if weather — unpredictable and illusory — takes a hand and power rationing should result.

Confusion Compounded

NEITHER university professors nor college students are pleased with the new regulations of the Selective Service Commission. By exempting college students from the draft if their grades are above certain minimums or if they pass certain tests, the commission failed miserably in solving the problem of assuring adequate numbers of professional graduates, including engineers, and of conserving and training brilliant scientific minds. Instead it has come up with an undemocratic program that promises exemption for young people who are lucky enough to go to college.

The plan has done nothing to relieve the confusion among the students themselves nor has it assured industry there will be an adequate number of new engineers. At present, even if all college students were exempted, the potential supply of engineering graduates will fall far short of the actual need for at least five years.

One university engineering dean has suggested a possible solution. He proposes that all able bodied youths be drafted and then assigned to colleges and universities on the basis of their aptitude, intelligence and other qualifications for advanced scientific and technical study. Attendance at a university under this plan would simply be another form of military duty instead of draft dodging.

EDITORIAL VIEWS

Public Reaction to Codes

WITH good intent back of most of them, attempts to get enacted new or revised electrical ordinances or state laws have stirred up hornets nests of public opposition and resistance in several parts of the West. None of the state law changes that were offered to legislatures in Washington, Idaho, Utah were passed. It was not that the measures themselves lacked merit or necessity, for in each state the growth in areas outside of incorporated cities having inspection has exceeded the volume within city limits, and certainly fire and accident hazard knows no city limits. But in each instance, as in the case of a proposed new ordinance in Salt Lake City, the public revolted in fear of more regulation or of what it thought might be designed merely to increase the cost of wiring by restricting wiring methods. All of which proves again that safety must be sold more thoroughly before even minimum standards are set.

Appliances Back Up

WHIPSAWED by the fates of war, electric appliances have been buffeted about as no other commodity in our economy. Considered by the bureaucrats as luxuries, they have been at times taken out of production, rationed and now curtailed. The public, that considers them necessities to a way of life it considers American, has been made to scramble for them, do without them and then be glutted with them until it hardly knows what to expect. As a result of two recent scares, the public has been hurried into buying lest there be no more appliances and radios soon, both false alarms.

Then when credit controls were clamped on in a belated effort to stem inflation, it was appliances and automobiles that were given "preferential" treatment. They got the works. Now the very ones who may need appliances are the ones who cannot make the big down payment and meet stiff monthly terms. Hence there is a real depression on in the appliance business. Television is in the same boat, and it is taking water fast, so far as many a pilot of an appliance store is concerned. Some are considering abandoning ship, but quick. And if they do, that will dump more appliances on an already demoralized market.

What are planners trying to do, give Joe Stalin another bloodless victory by depressing America's business life?

"It is obvious that we as a nation cannot have more to consume than we are able to produce. A nation cannot produce more with its labor except as it has more and better tools and greater skill in using them. There is no escape from this truth via the inflationary wage-price spiral that has unfortunately beset the nation since the beginning of World War II. Inflation of dollar incomes does not benefit the nation if prices of goods and services for which income is spent are also inflated. In the presence of such a spiral it is perhaps natural to make comparisons between the degrees of inflation in wages and in the prices of the things for which wages are customarily spent, although it is curious reasoning that contends that people should be paid in terms of the prices of things they desire to buy instead of in terms of the competitive worth of the work they perform. Labor leaders often resort to such reasoning when consumers' prices are advancing, but they quickly abandon it when consumer prices are declining . . . The rising cost of an hour of work is an established fact of our times. It is an important factor underlying the rising prices of the past and can be a dominant factor in price changes in the days to come." — Irving S. Olds, chairman, United States Steel Corp.

LENHART HEFFELMAN

CRAIG PEMBERTON

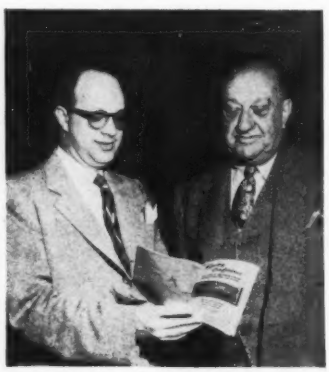
TRACY KOCH

Materials, Manpower Considered

Problems of materials procurement under the defense mobilization program and how to operate with shortages and in compliance with various government agencies were prominent in deliberations of the Rocky Mountain Electrical League, meeting in Denver, April 16-17. Many functions have been delegated to the field this time, said Charles E. Brokaw, director regional office, Department of Commerce. This should make it easier for the industry to operate under regulations than during the war when administration was largely centered in Washington. He expressed the hope for cooperation and that there would be no cases of violation in the Rocky Mountain region. John K. Markwich, regional compliance officer, said we may have a return to a buyers' market in 1953 when government spending will be cut back $20 billion, from $55 to $35 billion. Materials and manpower came up in many of the meetings. The subject was covered by J. A. Robinson, *Electrical World*, at a luncheon meeting as well.

In speaking of the manpower problem, Robinson said that there were many cases coming to light where the aircraft and other industries were raiding utility engineers with offers of higher pay ranging up to a hundred dollars a month. He feels that utilities will have to review realistically wages and welfare benefits of their engineers if they expect to meet the growing shortage of electrical engineering graduates and the competition of other industries. Materials and manpower were covered also by association president, M. C. Heffelman, in his opening remarks.

The second of two general sessions concluded the two-day meeting on Tuesday afternoon with a talk on area industrial development by Rolle R. Rand, Colorado Resources Development Council, and a quiz program. The problems of survival of small industry in the area were presented by Rand. It seems that industries in the Denver region have been getting the run around on government business. There have been many cases where the low bidder did not get the business, and in other cases bidders found that business was awarded to a firm in another area before the final bid opening date. His association proposes to do something about it by securing funds to put a man in Washington. The quiz program was an innovation that went over well. Answers to a wide variety of questions were given. Policy and rates for serving electric house heating was a topic that elicited much of the program's discussion.



HAINES PRAGER

Proceeding too rapidly with house heating in this area would be a mistake, warned consulting engineer Simon Halle. Degree-days are higher, some 6,000 per year, and rates are relatively higher than in other areas where house heating is being promoted. He favors radiant panel heating applied only in the ceiling. The floor is the wrong place, in his opinion.

In the engineering group a round-table discussion on civil defense brought the problem clearly in focus for utilities of the area. Several speakers said that relatively low vulnerability of the region was no excuse for complacency, lack of individual company action, and failure to set up an inter-company civil defense organization for mutual help.

Advantages of power pooling were discussed by L. R. Patterson, PS of Colorado. He cautioned against entering into wheeling arrangements without making sure that no hard bargains were being driven that would result in inequities. He emphasized that some means of sharing the benefits of diversity from pooled operations would have to be worked out. Walter Heston, ELECTRICAL WEST, said that, based on experience of the Northwest Power Pool, the diversity in a 500,000-kw intermountain pool might be 10%, or 50,000 kw. This diversity valued at $20 per kw-year would amount to a million dollars, he pointed out, to illustrate the large stake that utilities of the region would have in diversity resulting from pooling. H. A. Person, PS of New Mexico, said it is important to be sure that a utility get its incremental costs out of high-cost power delivered into a power pool.

A session on substations and transmission brought out several points. Cases were cited where burnouts had

resulted from heat of the sun on aluminum-painted cases of OCB and transformers. L. R. Jones, Colorado Central Power, said maintenance of tap-changing-under-load transformers is a problem to small utilities and that the advantages of the induction regulater should not be overlooked. He also made a strong case for air-operated metal-clad switchgear for substations of 5-15 kv, stating that savings of 50% can be effected in the cost of a substation. Another point was that aerial cable makes a good get-away from substations.

Practice of the Public Service Co. of Colorado under the reduced insulation values of air at the higher altitudes was given by L. M. Robertson. His company buys disconnects with 23-kv insulation for operation at 15 kv, oil circuit breakers rated at 23 kv for 15-kv operation, or else 15-kv breakers with 23-kv bushings. For altitudes of 6,000 ft, lightning arresters rated for 6,000- to 12,000-ft service, or one rating higher than recommended, are used. He emphasized the importance of being consistent in the use of higher insulation values for all apparatus to avoid weak spots. Generator and substation grounding practice was the subject of an exhaustive review of best practice, by H. F. Gidlund, PS of Colorado. His paper really constituted a "bible" of good practices, but was too long for comment here.

Satisfactory experience with loadbreak switches was reported by H. Hoffer, PS of Colorado. Emory Mallory, Colorado Central Power, said it would be an advantage to have a utility representative on local planning and zoning boards to protect the utility in matters of rights-of-way for lines in new subdivisions. H. E. Reader, Southern Colorado Power, and Ken Fuller, Colorado Central Power, said that short circuit ratios presented a problem in considering 4-kv versus 13-kv distribution. Fringe areas will be developed at 13 kv, said Fuller. Combating objectionable noise from unit substations was discussed by W. Dolde, PS of New Mexico. He said the only effective means found was to use pumice walls filled with sand. H. A. Person, PS of New Mexico, is asking manufacturers of cooling towers to investigate the use of louvers to permit deicing.

Adequate wiring promotion should be continued in this period of shortages to keep alive the idea of adequacy in the minds of customers, said A. A. Roebke, PS of Colorado. Two luncheons and two banquets with entertainment rounded out a full two days for the 350 who registered.

Utah P&L's president Gadsby makes inflation everybody's concern at Utah IAEI dinner

INSPECTORS

Salt Lake, Denver Boise and Butte

Whether metals like copper and zinc and insulations like rubber now being diverted into the war program will become so unavailable that new wartime substitutes must again be accepted in wiring systems was in the back of the mind of all electrical inspectors and contractors who attended the annual meetings of four Rocky Mountain area chapters of International Association of Electrical Inspectors last month. While the new 1951 edition of the National Electrical Code was the chief item of discussion, this other question concerned all. Manufacturers' men who spoke at the separate meetings gave slightly differing views as to the future availability of wire and galvanized conduit and fittings, some optimistic, others cautious.

The series of meetings began with the Utah Chapter, which met in Salt Lake City, April 17. Rocky Mountain Chapter followed, meeting in Denver, April 19-20; Idaho Chapter next, at Boise, April 23; and Montana Chapter, in Butte, April 26-28.

Robert A. Peterson, assistant technical secretary, IAEI, Chicago, gave each of the meetings a resume of the most important changes to be found in the new code. The most significant one, he said, was the permissive use of 20-amp circuits in residences, with No. 12 wire, and the changes in the various rules, such as those concerning lampholders and devices, to go with this new circuit rating. And in order to reduce the number of circuits per house, the changing of the two watts per square foot rule to three watts. Service entrance requirements were also raised to two No. 6 and a No. 8 neutral.

Most of the other changes are editorial, or to rearrange to clarify some rules found difficult in the past code edition. There are added, he said, two new articles, one (315) covering a new flexible metal conduit over which there is a plastic jacket to exclude water for use in wet locations where flexibility is needed; the other (665) deals with dielectric and induction heating equipment and diathermy apparatus.

Peterson announced that National Electrical Manufacturers Assn. will again publish an analysis of the new code, prepared by Arthur Abbott, which will be sent to all active members of the IAEI, and that others may buy from NEMA for a small charge.

Ken Williams, Salt Lake City electrical inspector, Utah Chapter chairman, opened the meeting with a plea for better understanding between inspectors and contractors. Mayor Earl J. Glade warned inspectors that the successful conduct of an inspection job, one that by nature is critical, carries with it a responsibility that none can escape, and that a kind approach and self control over emotions is paramount. "We who serve the public must remember," he said, "that we are dealing with a free America, and that a surprising number of the public cannot handle their emotional life. It takes two to make a quarrel."

Whether Utah needs a state electrical inspection law was the subject of a complete analysis by H. S. Morr, manager, Utah Fire Rating Bureau. Morr has acted as chairman of a committee which has several times submitted to the Utah legislature a proposed bill.

PETERSON CARPENTER

COX SIMON

MOULTON EATON

Reasons he gave for the need of such a law were: (1) Small communities cannot finance local inspection of competent character; (2) greater uniformity of interpretation and rules throughout the state would be obtained; (3) Utah is growing rapidly, much of this growth outside incorporated cities; (4) under present law even city inspectors have no jurisdiction over schools or public buildings where safety is especially needed; (5) lack of unsafe appliance control has made the state a dumping ground for appliances that are not safe enough to pass in other states. After describing the proposed law and the need for a start to educate the public to its need now, a resolution was voted by the chapter to sponsor such a law and to enlist public support for it.

After describing how Underwriters' Laboratories were founded, and how it tests and lists and labels electrical materials and equipment and then follows up by continuous factory inspections or reexaminations, H. G. Ufer, Western superintendent of the Laboratories told how to use the lists. He emphasized that inspectors and contractors should check with the lists to make sure that they are using materials for the specific purpose for which they were tested and listed.

Quite optimistic was P. A. Maughan, Westinghouse Electric Supply Co., about electric materials. Recent reduction in copper stockpiling by the government and removal of the embargo on foreign copper, he felt, would ease the wire situation and synthetics would replace rubber for insulation. Conduit might not be able to have as much zinc coating and black enamel finish might come back, he said. As for devices, manufacturers are cutting out frills, reducing numbers of items to essential ones, taking low quality and low priced items out of production.

The afternoon session was devoted to code discussion over which William T. South, South Salt Lake city inspector and vice-chairman of the chapter, presided. A panel consisting of L. John Christensen, L. B. Johnson, J. Vernon Sharp, Harold Morr, L. M. Christensen, Ken Williams, Amos Jackson, and J. Hyde Stayner, reviewed article scope and answered questions. South was later elected the new chairman of the chapter, with Ray L. Davis, Clearfield, as first vice-chairman; Loren M. Christensen, Salt Lake City chief inspector, second vice-chairman, and A. E. Fleming, General Electric Supply Corp., re-elected secretary-treasurer.

Sober warning that all citizens must protest to their congressmen the still extravagant and wasteful expenditures of many governmental bureaus was given the evening banquet by George M. Gadsby, president, Utah Power & Light Co. He made the federal budget a matter of personal concern of every person by breaking down what a billion dollar saving meant to Utah people. Every billion takes a 4½ million cost in either taxes or inflation to Utah people, he said. If paid in devalued money (inflation) it will make every necessity for life cost more and more. But there is no escaping paying.

Likening business publications and bulletins to instruments to guide those who pilot a business in today's "blind flying," W. A. Cyr, associate editor, ELECTRICAL WEST, described the scope and values of such helps. Attendance at this meeting both in numbers and in percentages of inspectors and contractors, was highest of all, some 150 total attending from the industry.

Rocky Mountain Chapter

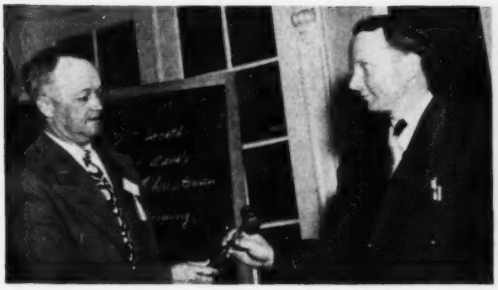
An entirely different panel of speakers, with the exception of Robert Peterson, addressed the two-day Rocky Mountain Chapter meeting in Denver April 19-20, over which Clifford Carpenter, Ft. Collins inspector, presided the first day, and Past Chairman Dale Markham, Colorado Springs inspector, the second day. Attendance was much improved over last year and the chapter reflected a new lease on life, despite no participation by the Denver electrical department.

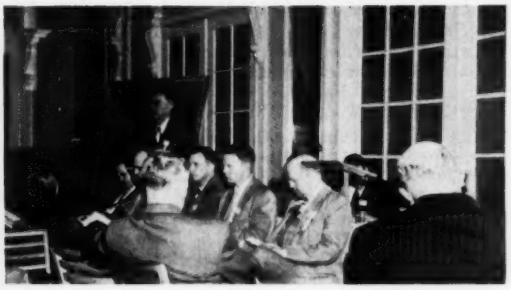
With demonstration boards, B. H. Etsinger, General Electric Co., Chicago, gave a lively talk on the low-voltage wiring system, stressing particularly the wide variety of benefits to the consumers from such a simple and flexible control system. He said the relays are being rerated to 20 amp and for use with 265-v fluorescent lighting circuits, thus widening the scope of their application in industrial uses. Besides the complete control of all lighting in a home from master switches, Etsinger described numerous industrial and commercial applications in connection with offices, schools, fire protection, portable partitions, belt conveyors, alarm systems and hospital call systems.

Thorel Vieau, Crouse-Hinds Co., Denver, after diagraming how explosions affect electrical fittings, related the few changes in the 1951 code relative to explosion-proof equipment. He made particular reference to hospital operating rooms and to a ground detector system, to warn of any defect in the electrical equipment used in operating rooms.

With a light gadget and sections of prismatic lenses, R. G. Dummel, district manager, Holophane Co., San Francisco, demonstrated the ways by which light rays can be bent to accomplish all manner of lighting applications. He preceded the demonstration by a review of lens development and illuminating engineering and likewise of inbuilt lighting. He spoke of the design features necessary to limit the temperature in such fixtures to safe limitations.

The copper situation was described by Ken Eaton, Anaconda Copper Wire & Cable Co., Denver, substituting for Al Tracy, district manager. Eaton reviewed the copper availability situation during the past year and the effect of recent government restrictions. Largely these are to reallocate the existing supply of copper to





Ken Williams hands gavel to new chairman South. Code panel, Utah Chapter, led by John Christensen ponders a code question

more essential users as the total productive capacity of copper in America is being exercised at present. Even foreign import will not help the situation greatly. He was asked many questions as to possible delays on different types of wire, both the DO48 (utility) and the DO97 (MRO) orders. Although he described many new types of insulation for wire, he admitted that under present conditions manufacturers would eliminate many types and some sizes in order to serve the demand to best advantage. Unrated orders have little chance of getting copper wire for a long time. Even DO97 has posed a problem of where to get enough copper to meet all the orders placed under it.

Harrison Davin, Bussmann Mfg. Co., Denver, went through the IAEI booklet on membership and its advantages for the group.

Peterson repeated his discussion of the IAEI activities and participated in the code discussion which consumed most of the two-day meeting.

An unprogrammed speaker was Simon Halle, electrical contractor of Colorado Springs. Halle recited personal experience which indicated that appliance dealers and the public had a very suspicious and sometimes bitter attitude toward inspectors and contractors over matters of ordinances and codes. He said that the public looked upon all metallic codes as a restrictive racket and that any time exceptions are made to the National Electrical Code they are going to look at it with disfavor and suspicion. The question was pointed up by one homebuilder who asked, "the difference between a metallic and a non-metallic job for wiring these houses means an additional appliance, such as a disposal—which do you think the public is going to want?" Halle said that the inspectors would find REA inspectors and managers friendly to state electrical inspection.

Carl Simon, Bureau of Reclamation inspector, Denver, was elected chairman; Gene Cox, Rapid City inspector, first vice-chairman; Art Jammer, Boulder inspector, second vice-chairman; Victor Moulton, Mountain States Inspection Bureau, Denver, secretary-treasurer. Executive committee elected included Clifford Anderson, Ft. Collins; Eugene Cruse, Wray; H. L. Davin, Denver; B. J. Goodhue, LaJunta; Ed E. Heintze, Denver; E. J. Strohminger, Englewood; H. J. Hearn, Pueblo; George Sticker, Boulder; Arthur F. Weers, Denver; Tom Mackey, Colorado Springs; G. R. Peel, Cheyenne.

Idaho Chapter

Compacted into an afternoon and evening, April 23, in Boise, the Idaho Chapter concentrated a tremendous amount of information and many speakers and much code discussion into a small space of time. In the absence of Claude Simons, Sandpoint, the chairman of Idaho Chapter, first H. F. Koch, contractor and chairman of the state electrical board, presided and then Harold E. Baker, Lewiston inspector, vice-chairman for District 1, conducted the meeting. In order of appearance, the following occurred:

Ray J. Larrabee, Underwriters' Laboratories Inc., Seattle, told what labeling by Underwriters' means as a guarantee of safe construction of wiring materials and equipment. Britt Nedry, director of the Bureau of Occupational Licenses, described the function of that bureau of the state. Robert Overstreet, central division manager, Idaho Power Co., reminded all of their interdependence and what the growth in customers and usage by them of electricity meant to each. He upheld the need for electrical standards as essential as milk and egg standards are to consumers of products of the dairy industry.

W. L. Robinson, state labor commissioner, described the functions of that department in labor matters and in safety inspection. He put the responsibility on electrical contractors and inspectors to correct hazards that make for unsafe working conditions.

Realistic and straight forward was the appraisal of the "Present Material Shortages" given by Joe Wright, manager, Afton Lamp Electric Co., Boise wholesaler. The contractor, he said, is walking a tight rope between a scarcity and a surplus. In appliances stocks already have backed up to make warehouses bulge, he said, and in many wiring materials the same is true. Only wire is short, and that shortage is mostly at a manufacturers' and distributors' stock level, not the contractors, he said. As a compensating factor there is a growing mortality in electrical contracting businesses which puts into other contractors' stocks sizable inventories of materials. These contractors seem to be closing up to go into defense work.

Unexpected things contribute to spotty shortages, he said. A West Coast conduit plant has plenty of conduit made but not enough zinc to galvanize it. Soon a return to "black" or enameled pipe may be compulsory. Wright, however, looking at late events, such as postponement of the aluminum restriction, expansion of production facilities in steel, possible revocation of the copper import duty, thought that, barring all-out war, the material situation would be in fair shape all year. Third quarter demands for war production, however, still unknown, might make it tough. He did advise that a contractor today, within his financial limitations, cannot go far wrong to carry a heavier inventory than he normally would.

J. Carl Baldridge, chief inspector for Idaho's electrical code, touched on the recent failure to amend that law by one vote. As a consequence the inspection in Idaho must continue on an inadequately financed basis. Through public and industry cooperation, however, he said they have been carrying on almost as though the state law was as complete as a local ordinance. With-

out even the revenue available in the past year, the work may have to be reduced. If inspection is to be financed, he said, the electrical industry must talk to individual legislators and convince them of the need. The public, he felt, is far ahead of its representatives in wanting and appreciating good inspection.

What licensing means to the distributor was told by Maynard Smith, manager, Graybar Electric Co., Boise. Contrasting conditions before the state licensing law, Smith said there was no way of knowing who was and who wasn't an electrican or contractor. Now with certification the distributor can stay in the wholesale business, and not be in retail, for which he has no license.

Henry Falkner, manager, Westinghouse Electric Supply Co., presented as diversion, a color movie, *The Banshee,* showing the Westinghouse jet engine equipped navy fighter plane of that name.

The remainder of the afternoon, and much of the evening, meeting was devoted to code discussion, led by Robert Peterson, IAEI. In the Idaho Chapter these were lively sessions with a wide range of questions from the many inspectors and contractors present. The evening dinner continued the business meeting, for it was no banquet. Les Johnson, General Electric Co., Salt Lake City, described and demonstrated the low-voltage system of switch control for residential and commercial applications, citing its saving in copper and steel.

W. L. Gaffney, secretary, Northwestern Section, participated greatly in the code discussion session. As a member of the electrical section, NFPA, on the NE Code, he was familiar with the reasoning behind the code changes. He also spoke about the annual section meeting to be held in Spokane, Sept. 19-21, a weekend, instead of at the beginning of the week as formerly done.

Elected as officers for the next two years were: Ralph Foley, Idaho Power Co., Twin Falls, chairman; Floyd Warner, Lighthouse, Kellogg, vice-chairman, District 1; A. H. Gates, Mountain Home, vice-chairman, District 2; Charles Davis, Burley, vice-chairman, District 3; "Corky" Jensen, Ashton, vice-chairman, District 4, and R. Carl Young, Boise, state inspector, secretary-treasurer. The executive committee elected consists of Claude Simons of Sandpoint, past-chairman; Lew Brunson, Rexburg; W. S. Featherstone, Wallace.

A resolution of thanks and a pen and pencil set were given to Harold Rising, who has been secretary of the chapter during the past two years. He has announced his resignation from the state electrical inspection department to enter into a business concern.

Idaho Chapter being told of its state law by Carl Baldridge, standing. Harold Rising and Harold Baker, seated, ran the meeting

Montana Chapter

For a state that has so few electrical inspectors and so little inspection, the Montana Chapter annual meeting at Butte, April 27-28, drew almost all of them, plus a good representation of contractors and distributors, manufacturers and utility people. Outside of Butte, Billings, Havre, Great Falls and Missoula, what inspection there is comes from REA inspectors. And although the need for rural inspection outside of cities was voiced often there seemed to be little demand for a state electrical inspection bureau and state inspectors.

In fact Harold Ebaugh, manager, Hill County Electric Cooperative, Havre, speaking on the question, "Do we want state electrical inspections?" said he opposed adding to the bureaucracy of the state another agency which it would be difficult to finance. He felt that perhaps legislation enabling REA and power company personnel to make inspections, or city inspectors to do so outside their incorporated limits, might serve Montana's purposes better.

Financing inspection in a sparsely settled state of great distances makes any other system infeasible, he maintained. A licensing of contractors to protect the public was felt to be necessary, however.

Another request he made, as an REA inspector, was a simplified code of definite specifications for farm and home wiring.

The Montana Chapter meeting, with record registration of 48, was presided over by Earl Buehling, inspector for the REA at Brady, Mont., chairman; "Doc" M. J. Rhodes, REA inspector at Huntley, Mont., vice-chairman, and Walter Lindsay, Havre, Mont., secretary-treasurer. Rhodes was made the new chairman at the election of officers, Ken Jenkins, REA inspector, Sun River Electric Cooperative, Fairfield, was made vice-chairman and Lindsay re-elected.

Timed to coincide with the presence in Butte of the General Electric "More Power to America" train, a visit to it was made the main attraction on Friday afternoon.

Other speakers who appeared at previous chapter meetings were Les Johnson, G-E Co., Salt Lake City, who described low-voltage control wiring and touched on the material situation; Robert Peterson, IAEI, who both told of code changes and led code discussion. He told also of IAEI activities. W. A. Cyr, ELECTRICAL WEST, discussed publications as a means of obtaining guidance in today's situation.

Motors and controls were talked about from a practical motorman's point of view by James M. Simpson, Electric Motor Service, Great Falls.. Simpson made it plain that motors must be selected for the job they are to do and controls for those motors selected carefully to match the operating characteristics of the motor. Too big a motor for a task is wasteful of electricity and damages the motor too, he illustrated. He stressed the code letter designation on a motor nameplate as a requirement to demand, and a guide to selection of proper control equipment. Another practical hint was to test a motor with its protective device installed, as a further check of reliable operation. He urged that inspectors and contractors do this as sometimes minor defects are not discovered until such a test is made.

Along the same line Harrison Davin, Bussmann Mfg. Co., Denver, both spoke of and demonstrated how fuses with time-lag characteristics built into them can give safest protection to motors. They offer a fuse nearer the rating of the motor for short circuit and overload protection, yet time delay to allow for starting current of high inrush. The need to use such fusing where competent maintenance is available was also stressed by Davin.

John Crawford, Butte city electrician, related a number of experiences in which wrong use was made by customers of equipment and where home wiring installations had proved fatal or hazardous.

John Larimer, Montana Power Co., Helena, as meeting general chairman, both handled the arrangements for the meeting, the train visit and banquet, and also acted as moderator in code discussions.

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THE MONTH IN BRIEF

Wheeling Agreement Signed

A 10-year agreement calling for transfer of USBR power over Pacific Gas and Electric Co. lines was signed last month, ending a long controversy between the two over "wheeling" Shasta power. The contract will eliminate need for a large investment in government-owned lines. PG and E will receive a wheeling charge of 1 mill per kwh for delivery at 44,000 volts or more; 1 mill plus 10c per kwh for delivery at 22,000 to 44,000 volts of monthly maximum demand and 1 mill plus 22c per kwh for lesser voltages. Wheeling probably will be chiefly to the Tracy pumps, which are expected to take about one-third the power generated at Shasta. However, other government installations will be eligible for the wheeled power. Late last month it looked as though West Side Irrigation District might be the first taker. A request to serve West Side's main pumping plant near Bethany, Calif., was sent to PG and E.

Interior's Power Program Cut

Several sharp cuts were made in the Interior Department's power program for the new fiscal year beginning July 1 by the House Appropriations Committee. The committee not only cut out funds for the controversial tie line between the USBR's Central Valley project and the Bonneville Power system, but it also called for an investigation by Interior Secretary Oscar L. Chapman of reports that Reclamation already had expended funds for surveying the unauthorized line. The departmental investigation is expected to center on claims that Reclamation Commissioner Michael W. Straus and Richard L. Boke, regional Reclamation director, approved the use of funds. Cost of the line is estimated at $6,269,000; $1.7 million was requested for fiscal 1952. A small cut in BPA's construction budget resulted in $67.5 million approved, against $69.5 million requested.

Idaho Governor Opposes WWP Sale

Proposed sale of Washington Water Power Co. to a group of PUDs "would directly operate to increase inflationary pressures," Idaho Governor Len B. Jordan said last month in a letter to Oliver S. Powell, member of the Federal Reserve Board and chairman of a 12-man committee to carry out a program of voluntary credit restraint as a brake on inflation. The governor pointed out that, under the purchase plan, $105 million in tax-exempt revenue bonds would replace $51 million in present fully taxable securities and urged the Federal Reserve Board and the committee to oppose the transaction vigorously. He also called attention to the loss of $2 million in federal taxes now paid by the company.

Aluminum Reduction Plant Scheduled

A $45 million aluminum reduction plant will be built at Wenatchee, Wash., by Aluminum Co. of America, which on April 28 signed a power contract with the Chelan County PUD. The plant will produce 170 million pounds of pig aluminum annually and will require 180,000 kw of power. Chelan PUD and Bonneville Power Administration will supply the power. Also signed last month was a 50-year lease agreement between Puget Sound Power & Light Co. and the PUD, enabling the district to install six new generators at Puget Power's Rock Island plant near Wenatchee. The new machines will increase the plant's output by 150,000 kw. Alcoa has announced that it will step up production of its rod, wire and cable plant in Vancouver to produce one million more pounds of cable monthly. Rated capacity is now three million pounds.

REA Co-ops Still Under Commission

A bill to exclude REA co-ops in California from jurisdiction of the public utilities commission was killed in the lower house of the state legislature. The negative vote, 41 to 29, came on a motion to withdraw the bill from committee to the floor. The state senate, largely rural, had passed the bill as an urgency measure without a dissenting vote. A subcommittee report recommending against passage of the bill followed hearings in three cities of the state. It termed unfounded claims of proponents of the bill that the federal REA would not lend money to rural cooperatives that were under control of a state commission.

FPC Counsel Would Approve Tacoma Dams

Counsel for the Federal Power Commission has recommended to the commission that it approve the city of Tacoma's application for permit to build two hydroelectric dams on the Cowlitz River, according to information received by Commissioner C. A. Erdahl. The counsel said in his brief that the $142 million cost is reasonable and that ample power markets make the dam economically feasible. There is no evidence, he believes, to support the claims of fishery interests that fish and power can't exist together on the river. Should all the fish run above Mayfield be lost, however, the annual net benefits in power production would offset this loss by $500,000 annually, his report declares.

Ross Dam Addition Pushed Ahead

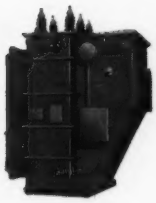
At suggestion of the Defense Electrical Power Administration, Seattle City Light will attempt to put its new Ross power house into production during the winter of 1952-53, instead of in June 1953. John M. Nelson, assistant superintendent of City Light, told the city council's utilities committee that DEPA promised assistance with priorities on scarce materials, if the city would advance its schedules.

Plant's Power Requirements High

Although the detailed break down is not available for security reasons, it has been learned that the total annual power requirements of the Basic Magneseum plant, Henderson, Nev., will exceed a billion kwh within a year as planned expansion of the chemical and metals companies nears completion.

7 Great Features

ALLIS-CHALMERS 5/8% STEP REGULATORS



AFR
Three phase regulator, sizes through 69 kv, 2500 kva.

DFR
Single phase regulator, sizes through 6900 v, 250 kva.

JFR
Single phase regulator, 11.4 and 38.1 kva, 7620 v.

		AFR	DFR	JFR
1	5/8% Steps	✓	✓	✓
2	Close regulation (±1 volt band)	✓	✓	✓
3	Easy control adjustment. The same type control used on all sizes	✓	✓	✓
4	Close average voltage (maintained by voltage integrator)	✓	✓	✓
5	Long life contacts of liberal design to withstand hundreds of thousands of operations	✓	✓	✓
6	Tap changing drive mechanism with balanced spring action to eliminate shock . . . operates under oil for long trouble-free life	✓	✓	✓
7	Unit construction to simplify your maintenance requirements.	✓	✓	✓

FOR ALL REGULATION JOBS — from an 11.4 kva regulator on a small feeder to the biggest 2500 kva three phase unit — Allis-Chalmers 5/8% step regulators provide all seven of the quality features checked off above.

That's why you can count on Allis-Chalmers for regulation that helps boost capacity, increase revenue, and improve customer good will.

In addition to these important advantages, the single phase 5/8% step regulators require only 1/3 the exciting current of older types of single phase regulators. The low exciting current releases system capacity for useful loads.

Get the complete facts on how Allis-Chalmers 5/8% step regulators can help you from your nearest Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3370

ALLIS-CHALMERS

Originators of 5/8% Step Regulation

NEW CONTROL CENTER FINDS READY MARKET

where requirements may change any day

AIR CONDITIONING and miscellaneous motor controls in U.N. Secretariat Building are operated through this Trumbull CENTR-A-POWER Control Center. The control center is fed from the Trumbull FLEX-A-POWER LVD busway distribution system running throughout the building.

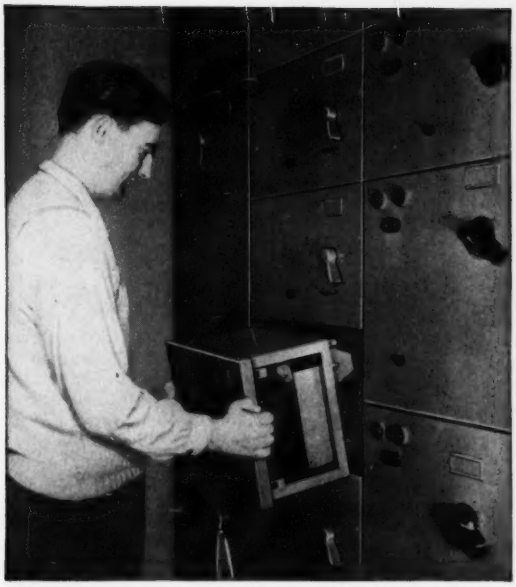
Buyers are asking this question about any new equipment under consideration: can it be adapted to conditions now unforeseen?

That is why you'll find yourself welcome when you talk about the convertibility — as well as the convenience, safety and attractive appearance — of new Trumbull CENTR-A-POWER Control Center.

Standardized starter-and-disconnect units are grouped in pre-fabricated, rigid steel troughs, in any arrangement. Any number of troughs can be set up in a variety of formations: back-to-back, "U", "L", etc. The control units, called CENTR-A-PLUGS, which are stabbed into silver-plated vertical bus bars, are interchangeable from one trough to another.

Trumbull's CENTR-A-POWER Control Center is a companion to the recently announced CENTR-A-POWER switchboard, and is another in the series of new Trumbull developments for greater economy, safety, and efficiency in electrical control and distribution.

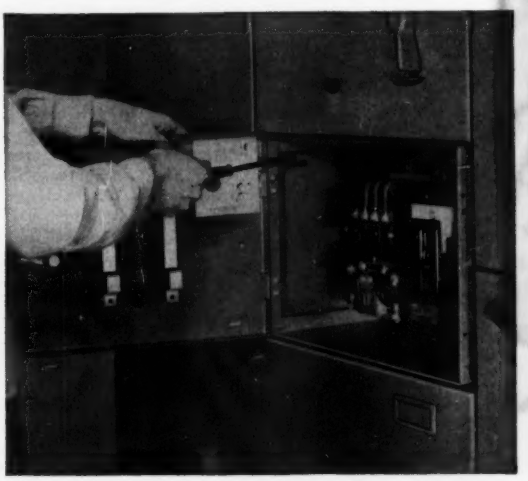
Bulletins are available for your interested customers. THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Conn.



LOW-COST INSTALLATION results from standardization of components. From the complete selection of troughs and control units, the exact combination can be made up to meet any requirements. Floor space is saved by the compact all-front-wired trough design. Yet the ample gutter saves time by giving easy access to wiring.

EASY TROUGH ADDITION recommends CENTR-A-POWER Control Centers for applications where needs may change from time to time. Arrangements of both troughs and controls can be easily altered or added to, and even bus capacity can be increased as conditions require without change in insulators or steelwork.

SIDE-VENTILATED CENTR-A-PLUG is stabbed in from front. Each unit contains a starter-and-disconnect unit, which may be either Trumbull's new HCI high-capacity interrupter safety switch or a Trumbull AT circuit breaker. Ventilated side construction, together with trough vents top and bottom, keep controls uniformly cool.



SAFE, EASY SERVICING is provided by the interlock which requires the disconnect handle of the deadfront CENTR-A-PLUG to be moved to OFF position before it can be opened . . . and by the quick-clip method of attaching the control unit to the trough which eliminates the nuisance of screws, nuts, and loose parts.

TRUMBULL (T) ELECTRIC

PLAINVILLE, CONN.

THIS MONTH'S NEWS

Reregulating Dam Proposed For Pelton Development

A new proposal designed to reconcile fish and power interests on the Deschutes River in central Oregon has been submitted to the federal fish and wild life service and Oregon Fish Commission by Portland General Electric Co.

The power company has offered to construct a reregulating dam at a cost of $3 million and contribute $1 million to the state for fish handling, if the state and federal services will act favorably on PGE's request for permission to build the Pelton Dam on the Deschutes, near its confluence with the Metolius River. The offer would boost cost of the Pelton project to some $22 million.

The proposed reregulating dam would be put three miles below the Pelton Dam. Its purpose would be to stop excessive fluctuation in the flow from the power dam. It has been the contention of fishing interests that this fluctuation would prove disastrous to fishing in the area.

With the $1 million contribution to the state it is proposed to enlarge the hatchery on the Metolius River and provide other fish handling facilities. In addition to this contribution, PGE agrees to pay up to $100,000 a year for extra handling needed for taking eggs from holding ponds above the reregulating dam to the hatchery and then trucking fingerlings back for release below the dam.

PGE asked the state and federal services to reconsider the Pelton project, in view of the nation's power requirements in the present emergency.

Tacoma Reports Preliminary Costs on Cowlitz Projects

Although not a shovelful of earth has yet been turned, the City of Tacoma, Wash., already has spent nearly $700,000 for two dams it proposes to build on the Cowlitz River at Mossyrock and Mayfield, Utilities Commissioner C. A. Erdahl reports.

If fisheries interests have their way, the dams may never be built. Tacoma's application to build the structures is pending before the Federal Power Commission, despite action by the 1949 state legislature in declaring the river a fish sanctuary.

Expenditures to date for the two proposed dams total $697,060, of which $228,224 went for exploration and geological investigations, $150,028 for preliminary surveys and $140,460 for consultants. Hydraulic studies cost $15,516; preliminary plans, $47,211; tools and equipment, $3,653; expenses for hearings before the state and the Federal Power Commission, $28,686; fish handling studies, $13,713; purchase of water rights, $35,972; legal fee, $11,802.

Water Users' Arizona Plant Will Go On Line in 1952

Power from its new $5,000,000 steam-electric plant is scheduled to be on the line by June 1952, according to the Salt River Valley Users Assn. in central Arizona. Ground for the 30,000-kw plant was broken late in March.

The new plant is being constructed south of Phoenix. Its output will be added to present generating facilities in the association's system of hydroelectric plants along the Salt River, and the steam and diesel generating plant at Tempe.

The plant was designed by Bechtel Corp. It will supply power for farms, mines, and other industries in Maricopa, Pinal and Gila counties.

● **Preliminary work** is underway on a $26,000,000 hydroelectric dam of the Yale project on Lewis River 30 miles east of Woodland, Wash., for Pacific Power & Light Co. Morrison-Knudsen Co. of Boise has the contract. Some 700 men are expected to be at work on the project by May 1. The dam will be 305 ft high above bedrock, with a power plant to produce 100,000 kw initially.

● **Preliminary construction** has begun at Renton, Wash., on a $500,000 storeroom and garage for the Puget Sound Power & Light Co. Stone & Webster of Boston, Mass., has the contract for the 400x100-ft structure, of steel and concrete block construction, on piling foundation.

California Oregon Power Co. Asks Permit for Klamath Plan

Application has been filed with the Oregon Hydroelectric Commission by the California Oregon Power Co. for a permit to construct a power plant in the Klamath River canyon seven miles from Keno, Ore. Oregon State Engineer Charles E. Stricklin announced that a hearing on the application will be ordered.

The project, designated as Big Ben No. 2, would consist of a dam 310 ft long and 52 ft high, and a power house which would house two 25,000-kw generators. The plant would be larger than any of the 14 now operated by the company.

Big Ben No. 2 would be the first of six plants the company proposes to build in the Klamath River, which flows through southern Oregon and northern California. Others would be designated as Big Ben No. 1, Big Ben No. 3 and Scott Cave, all in Oregon, and Warm Springs and Iron Gate in California. Cost of the entire program would be about $50 million.

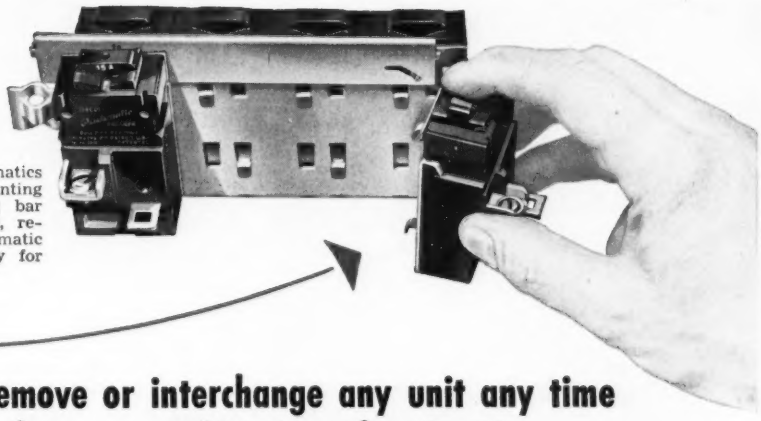
A recent opinion by Oregon Attorney General George Neuner paved the way for Copco to undertake the projects. The company has had the program under consideration for a number of years, but a previous opinion by an Oregon attorney general held that the federal government had sole rights to Klamath River water. This barrier was removed by the later ruling in which it was held that the state has jurisdiction.

PS of New Mexico to Start Steam Plant in October

Public Service Co. of New Mexico will start construction of a 20,000-kw steam plant at Albuquerque next October, Arthur Prager, president, announced. Cost of the project will be $2,984,000, of which about $270,000 will be spent this year. The plant is expected to be in operation by October 1952.

The company's annual report showed that assets increased by more than $4,000,000 in 1950 over 1949. The report said the company is serving 57,758 electric customers.

Meet specific panelboard needs faster with interchangeable *Pushmatics*®



To add individual Pushmatics just place unit on mounting rib and push locking bar down. Connect wiring, restore service and Pushmatic Electri-Center is ready for use!

Add, remove or interchange any unit any time for any combination of ratings!

NEVER before has a panelboard offered the flexibility of BullDog Pushmatic Electri-Centers!

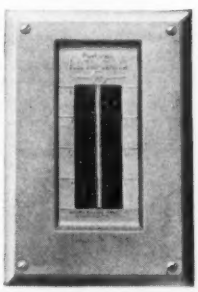
Pushmatics are the same size, regardless of rating or type, and are completely interchangeable. Any Pushmatic can be installed at any point on the mounting rib. Pushmatics can be added to the Electri-Center faster, more economically and with less confusion.

Exclusive push-button switching, too!

PUSH . . . it's on! PUSH . . . it's off! PUSH . . . it's on again if circuit is broken by short or overload. Pushmatic offers the simplest switching available anywhere. No complicated resetting to fuss with . . . no fuses to replace.

And you can meet any load condition with these Pushmatics: Standard Thermal MAGNETIC and Thermal ULTRA-MAGNETIC, the latter available with or without BullDog's exclusive AMBIENT COMPENSATING FEATURES. Ratings of 15, 20, 30, 40 and 50 amperes, 1 pole, 120 V., or 2 poles, 120-240 V., A.C.

Now investigate Pushmatic Electri-Centers . . . the finest panelboards on the market.



Handsome BullDog Pushmatic Electri-Centers are available from 2 to 42 circuits. Pictured: 8-circuit Service Equipment Type. Plenty of wiring room even in smallest Electri-Centers for easier installation.

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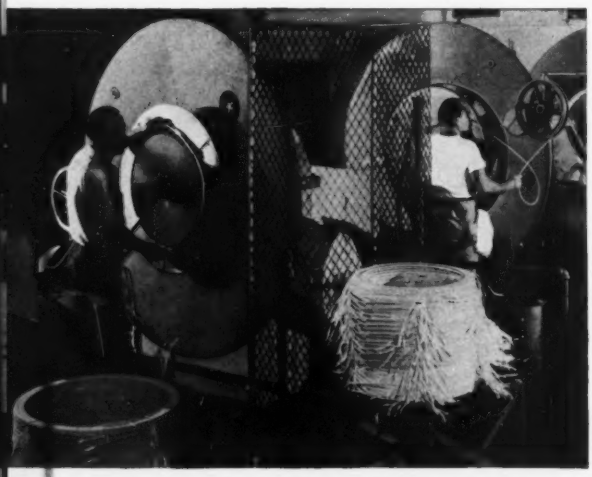
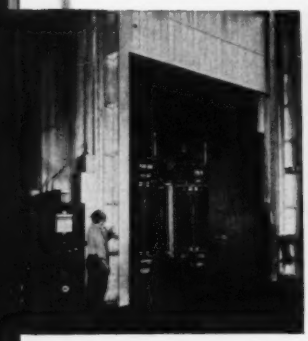
MORE POWER FOR AUTO ASSEMBLY PLANT



These special machines wind a pair of high voltage disc coils simultaneously with uniform tightness from a continuous conductor. This method eliminates connections at the center of the double coil. Coils are stacked, clamped, and brazed together. Uniformly placed spacers are cemented between the coils, giving good mechanical support without impeding circulation of the coolant.



Two of eight ovens designed specially for high velocity drying. Air is completely circulated every two minutes and changed every four minutes. The core and coil assembly is baked until completely dried and checked by power factor and megger readings. After drying, all bolts are tightened and the assembly is immediately placed in insulating liquid in its own tank.

Radiators are made corrosion-resistant by a 5-step bonderizing process and then rotary flow painted.

On the right is a radiator being hoisted from the oven after baking for 15 minutes at 350°F. This produces a smooth, tough surface that resists industrial atmospheres and severe climatic conditions.

Consumers Power Company of Michigan Installs Two More Allis-Chalmers Transformers Into State-Wide System

POWER TO RUN machine tools and motors, to move assembly lines . . . power to produce thousands of automobiles each week is supplied by this pair of 10,000 kva Allis-Chalmers transformers. They supply economical power for a large auto manufacturing and assembly plant in Michigan.

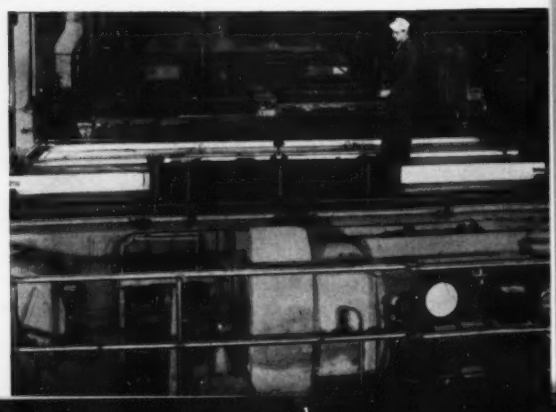
These transformers, installed by Consumers Power Company, are designed to have a low rate of depreciation and low maintenance cost. For over a quarter of a century, Allis-Chalmers power and distribution transformers have met the exacting standards of the Consumers Power Company's state-wide system that supplies 1,000,000 kw to 56 Michigan counties. These new transformers will help make satisfied customers for years to come.

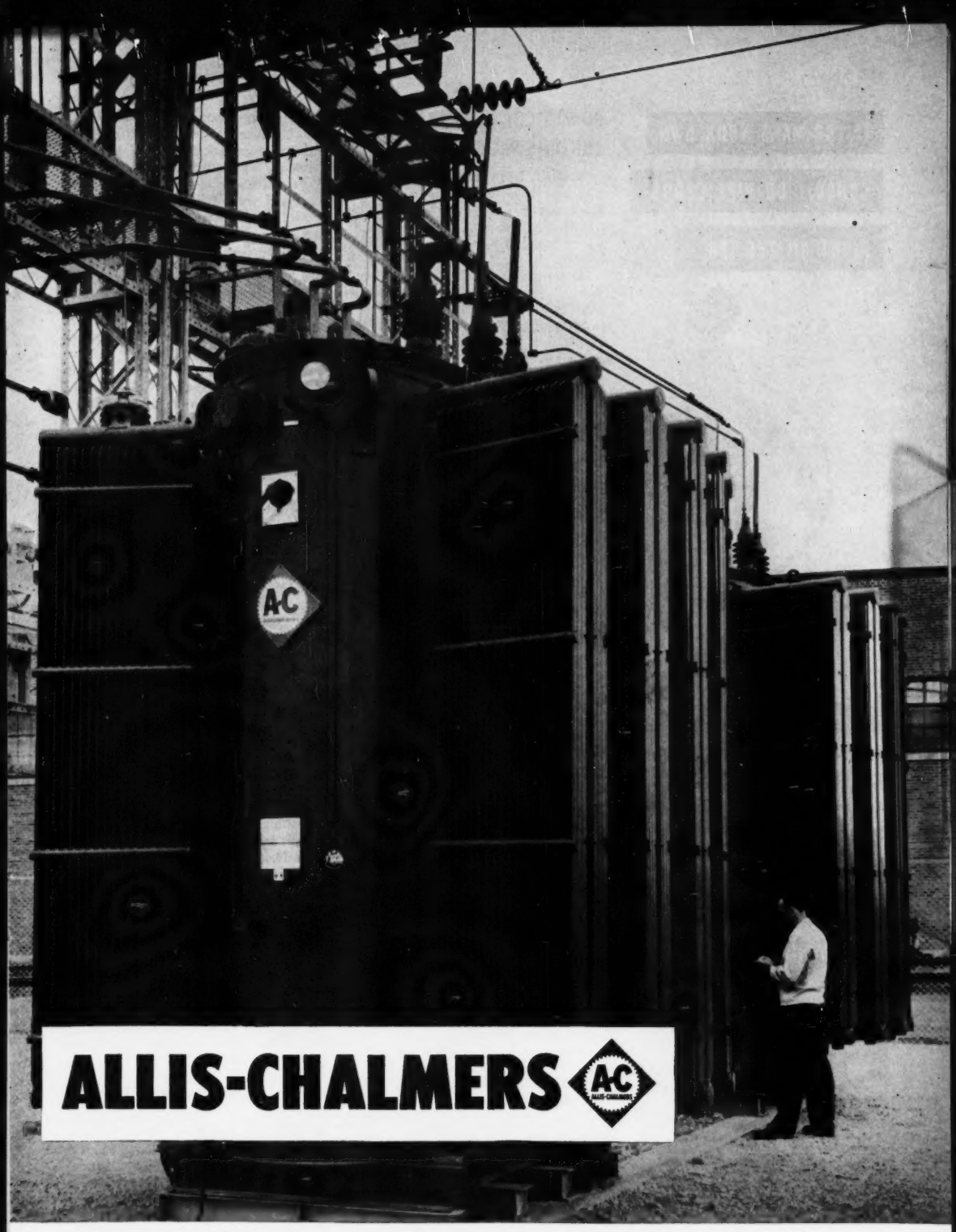
Because they're equipped with protective inert gas system (which preserves the high dielectric strength of the oil and minimizes filtering requirements) sludge and acid formation is retarded. They're electrically designed for proper stress protection . . . high and low voltage windings, coils and leads are strongly supported and securely braced against repeated short circuits. Specially designed radiator gaskets eliminate leakage.

These are just some of the reasons why Allis-Chalmers transformers are doing a good job of power distribution for the nation's progressive electric power producers like Consumers Power Company. Whether standard or special designs, Allis-Chalmers can produce the specific transformer for your system.

Why not call in your A-C sales representative for more information on Allis-Chalmers power transformers? Offices in 64 principal cities. Allis-Chalmers, Milwaukee 1, Wis.

A-3387





Two 10,000 kva 3 phase, 60 cycle, 55° C rise, positive pressure inert gas equipped outdoor transformers installed by Consumers Power Company at Pontiac substation. Soon to be added is a 30,000 kva Allis-Chalmers power transformer at Erie.

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...simple, quick with the

GREENLEE HYDRAULIC BENDER

Yes, quickly make bends *exactly* as you want them, when you want them, where you want them. Compact, portable GREENLEE Hydraulic Pipe and Conduit Bender lets you do this in a jiffy. *One-man operated* to produce smooth, accurate bends in just a few minutes . . . in pipe up to 5", rigid and thin-wall conduit, tubing, bus-bars. Owners report timesavings up to 60% and more, elimination of cost for manufactured bends and fittings, and "clean", tailor-made installations every time. Get facts now on this time-saving tool that often pays for itself on first few jobs! Write for free Bender Booklet, Greenlee Tool Co., 1765 Columbia Avenue, Rockford, Illinois.

TOOLS FOR CRAFTSMEN

GREENLEE

Other GREENLEE timesaving tools for electrical work: Hand Benders; Joist Borers; Cable Pullers; Knockout Tools; Auger Bits and Drills.

POWER COMPANY EXTENDS BUILDING PROGRAM

A $86,000,000 extension to Pacific Gas and Electric Co.'s postwar building program was announced last month. It will add another 500,000 kw of steam power in northern California.

The program will bring the company's investment in new facilities since V-J Day to more than one billion dollars. Additions total 2,306,000 kw.

Four 125,000-kw generating units have been ordered. Locations for installation have not yet been determined, but at least one of the generators is expected to be in operation by late 1953.

Contract Let on Final Phase of McNary Dam

Low bid for the third and final phase of construction on McNary Dam was submitted by McNary Dam Contractors, present contractors on the project. The bid was $58,416,459. Columbia Contractors of Boise, only other firm to bid, asked $61,972,032.

McNary Dam Contractors include a group of three construction companies: Guy F. Atkinson Co., Portland; Ostrander Construction Co., Portland; Jones Construction Co., Charlotte, N. C.

The contract calls for construction of the remaining portion of the spillway, power house, abutments and appurtenant structures. Construction schedules call for operation of two power units of 70,000 kw each at the end of 1953.

City Light Expansion Brings Heavy Spending

The next three years will be the period of heaviest spending in the $100,000,000 program of Seattle City Light to increase the capacity of its hydroelectric project.

With nearly $30,000,000 spent during the last three years, an additional $65,000,000 will be paid out by the end of 1953. About half this amount will have to be raised in additional bond issues, depletion of the present $14,700,000 construction fund being expected by the end of the year.

City Light's bonded debt was increased to $93,464,000 with the recent $25,850,000 issue for purchase of Puget Sound Power & Light Co. properties. It is expected to reach $120,000,000 before the current construction program is completed.

The program involves 310,000 kw of new generation, as well as transmission and distribution facilities. Ross Dam was completed two years ago and work will start shortly on a power house below the dam.

PUD Asks Hydro Permit On Similkameen River

The Okanogan County PUD of Omak, Wash., has applied to the Federal Power Commission for permission to construct a hydroelectric project on the Similkameen River. The project would include a power house containing two 2,500-hp turbines and two 1,600-kw generators, with a concrete dam across the river and a transmission line to Oroville.

● **Contract** for three 15,800-kva alternating-current generators for Albeni Falls dam in northern Idaho drew a qualified low bid of $2,229,186 from the English Electric Co. Ltd. of Stafford, England. The qualification stipulated that the generators be duty-free. Three American firms submitted bids with 30% escalation clauses. General Electric asked $2,357,596; Westinghouse, $2,394,388, and Allis Chalmers, $2,546,269.

● **Power City Electric Co.,** Spokane, has offered a low bid of $356,531 for construction of Bonneville Power Administration's Pendleton - La Grande 45.2-mile wood-pole 230-kv transmission line. Low bid of $627,155 for construction of Bonneville's double circuit from Maupin, Ore., to the Detroit Dam site was submitted by Lee Hoffman, Portland. The line will be 21.6 miles in length and will include 94 steel towers.

● **Contract** for the erection of a 170-kv power line from the Kootenay River to Kimberley has been awarded to F. A. Tucker Canada Ltd. of Montreal. Consolidated Mining & Smelting Co., in announcing the award, said the contract calls for completion of the 85-mile line by the end of November 1952. No amount was announced for the contract.

● **Although underbid,** Allis-Chalmers Mfg. Co. has been awarded a $45,654 contract by the Tacoma, Wash., Board of Contracts & Awards for three transformers. The low bid carried an escalator clause that made it less advantageous to the city than the Allis-Chalmers proposal, said Arthur Angove, city purchasing agent.

Lowest priced...Immediate deliveries

NO MORE WAITING for factory-assembled distribution panelboards! It takes only a few minutes to assemble Federal Noark Flexunit Plug-In Distribution Panelboards from your wholesaler's stock of standard parts. You can provide for future circuit expansion . . . and because of mass production, Flexunits sell for the lowest prices obtainable.

Five standardized surface cabinets in three sizes of mains (200, 400 and 600 amp.) provide for a maximum of:

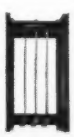
★ Twenty-eight 30 amp., 3 pole, or eighteen 60 amp., 3 pole, or fourteen 100 amp., 3 pole or three 200 amp., 3 pole, 230v. branches can be combined in one panelboard.

★ Other combinations of 30, 60, 100, 200 amp., may also be assembled in a Flexunit Plug-In Distribution Panelboard.

★ Filler plates to cover unused spaces are available in four sizes.

Order Flexunit Plug-In Distribution Panelboards from your Federal Noark wholesaler for fastest service and lowest prices. Federal Electric Products Company, 50 Paris St., Newark 5, New Jersey.

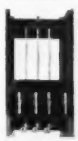
ASSEMBLE FLEXUNIT DISTRIBUTION PANELBOARDS FROM YOUR WHOLESALER'S STOCK



1 Chassis has 3 silver-plated copper bus bars arranged on edge to receive plug-in units.

2 Rugged plug-in Federal Noark Flexunits are complete with fusible pull switches.

3 Snap! . . and Flexunit is in place. Secured by screws, Wurdack pull switch units are ready to operate.



4 Mounted in this chassis are 2 plug-in Flexunits. Unused space can be covered with filler plates.

5 Note ample gutter space available when chassis is mounted in the box. Complete panelboard above.

FEDERAL NOARK

Federal NOARK

Complete line of Federal Electric Products includes Motor Controls, Safety Switches, Service Equipment, Circuit Breakers, Panelboards, Switchboards, Control Centers, Bus Duct ★ Sales offices in principal cities.

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FRANCHISE CONCEDES RIGHT TO CHALLENGE

Pacific Gas and Electric Co. has concluded an agreement for new electric and gas franchises with the City of Oakland, but the contract concedes the State of California's right to challenge the legality of the arrangement.

The state had protested the new franchises in an attempt to force the utility to pay for relocations of its facilities made necessary by state freeway construction.

The new agreement gives PG and E a 50-year extension of its electrical franchise, to 2001, and eliminates the ambiguity from the company's gas franchise, which give it a perpetual right to sell "illuminating" gas, but made no mention of gas for heat or fuel.

Under state law, the state must pay for utility relocation costs if a utility's facilities are lawfully maintained in a location not a state highway at the time of the installation and if its franchise doesn't specifically require that it pay such costs.

The state contends that the gas franchise was not legal, and that it should pay for gas relocation costs. PG and E has borne about $83,000 in relocation costs and has billed the state for that amount. The company plans to sue for the amount if no agreement is reached.

City of Vancouver, PUD Sign 15-Year Contract

Vancouver, Wash., city commissioners have approved a 15-year contract with Clark County PUD. It provides for installation by the PUD of 135 ornamental mercury-vapor lamps in the business district and on the Pacific highway through the city, and some 600 additional lights in the residential area.

The entire installation, including the ornamental system, will be owned by the PUD which will receive a flat rate for the service. A bond issue of $150,000 will be issued by the district to pay for the installation.

Over opposition by the PUD, the city recently levied a 3% gross revenue tax on the district, which passes the tax on to consumers on their monthly bills. The district acts as a collecting agency for the city, turning the tax money over to the city treasurer. Thus indirectly the entire cost of the improvement will be passed on to the PUD's customers.

About $32,000 a year will be realized from the revenue tax.

The Defense Production Problem

To win out in the struggle for freedom into which the Russian Communists have plunged us we must do at least four things. We must:

1. Speedily carry through a program of defense production which, at its peak, is scheduled to take about one-fifth of our national output.

2. Pay for this program as we go, by methods that will enable us to maintain the effort for an indefinite period – as long as may be necessary to insure peace and security.

3. Manage intelligently and endure intelligently a set of direct government controls which, in certain critical departments, will put our national economy for a time in a hateful straight jacket.

4. See that these emergency controls are not fastened upon us permanently thereby presenting to our Soviet antagonists a major victory for collectivism on our home front.

This is the first of a series of editorials designed to present in the simplest terms these key aspects of our struggle to preserve our free institutions.

A Staggering Task

The magnitude of the defense production job staggers the imagination. Over the next year it calls for a larger volume of goods and services than the 20 million people of the states of New York and New Jersey will use for all purposes. The (London) TIMES has observed that, taken alone, the increase of defense expenditures which has been budgeted for the federal government's coming fiscal year (about $30 billion) "is in itself not far short of the total national income of the United Kingdom."

Yet so powerful is the production machine created by free American enterprise that, at the scheduled peak, the defense program will take only about one-fifth of our total national output. The exact form and dimensions of the program will, of course, be hammered out on the anvil of public and congressional debate. But the President's recent estimate of an annual rate of expenditure of $45-55 billion for defense by the end of this year may well turn out to be somewhere near right.

To meet even these vast requirements of defense production we are in better shape technically than we were when we started to prepare for World War II. Our industrial plant and equipment is greatly improved. Over $65 billion has been invested in it since V-J Day. Our working force is about eight million larger than it was ten years ago and much better trained.

The difficulty, and it is a very serious economic difficulty, is that we must fit the defense program into a productive machine that has been almost fully extended to meet the needs of a booming civilian demand. The present plan is to step up defense production during 1951 from about 7% to about 18% of our total national output. Because there is relatively little slack in our economy, this means that civilian production at the outset must

be cut back as defense production is stepped up.

The cut-back of civilian goods must be especially severe in the case of products made of metal. This is particularly true of goods that use scarce strategic metals such as aluminum and copper. Of our total defense production program, about half will go for "military hardware" – airplanes, guns, munitions, tanks and the machinery to make them. By the end of 1951 defense requirements are scheduled to absorb most of the metalworking production not required for essential construction and for the spare parts necessary to keep existing equipment running. For a time at least, there will be a sharp cut in the supply of new metal products available to civilian consumers. The defense squeeze on both materials and manpower will also cut sharply into housing and other civilian construction.

For the Short Run — Controls

In the short run there is no answer to the problem of meeting defense production schedules except controls. Sharp reduction of non-defense expenditures by government is essential and would help greatly. But the basic fact is that we cannot increase our total production fast enough to meet immediately both civilian and defense requirements.

Controls are needed, therefore, to switch resources from civilian to defense production, and at the same time prevent the combined demand for critical products from sending prices right through the roof. In the case of many scarce strategic metals such as nickel, copper and cobalt, the task of increasing output is especially difficult because our limited supplies are tucked away deep in the earth in many quarters of the globe.

For the longer pull – and that is what we must face – there is another answer to our defense production problem that is infinitely better than controls. And this time, in contrast to World War II, it is all-important that we get the right answer to our defense production problem for the longer pull and that we get it right now. In World War II we geared our economy to meet the requirements of a relatively short and decisive conflict. Now our leaders, however they may differ as to methods, are well agreed that, at best, "the conditions under which we labor may persist for ten, fifteen or twenty years." That is General Bradley's phrase.

For the Long Pull — More and Better Production

For this longer pull, the constructive answer to our problem of defense production is clearly more and more efficient production all along the line. It is true that overall we now have the most efficient industrial establishment in the world. But, even so, much of it is far short of attainable efficiency. Some plants using up-to-date equipment and methods are as much as six times more efficient than others in the same industry that are lagging in modernization.

Our Director of Mobilization, Charles E. Wilson, has clearly in mind this problem of increasing our industrial efficiency. The first step in his job, as he conceives it, is to get out an adequate supply of weapons to equip the army, navy, and air forces already mobilized or in process of organization by us and our allies. The second step is to make sure of our capacity to produce both "military hardware" to meet any increased requirements and the maximum possible volume of goods for civilian use.

In concentrating on more and more efficient production, Mr. Wilson is squarely on the beam. We can attain his objective – by sustained effort on the part of each one of us backed by up-to-date industrial methods and equipment.

If we do that, we can maintain indefinitely an adequate defense effort and at the same time enjoy a standard of living higher than any other in the world.

Additional production and more efficient production are our surest safeguards against our two most menacing enemies on the home front – the deadly inflation that can destroy our free economy, and the strangling government controls that can destroy our political freedom.

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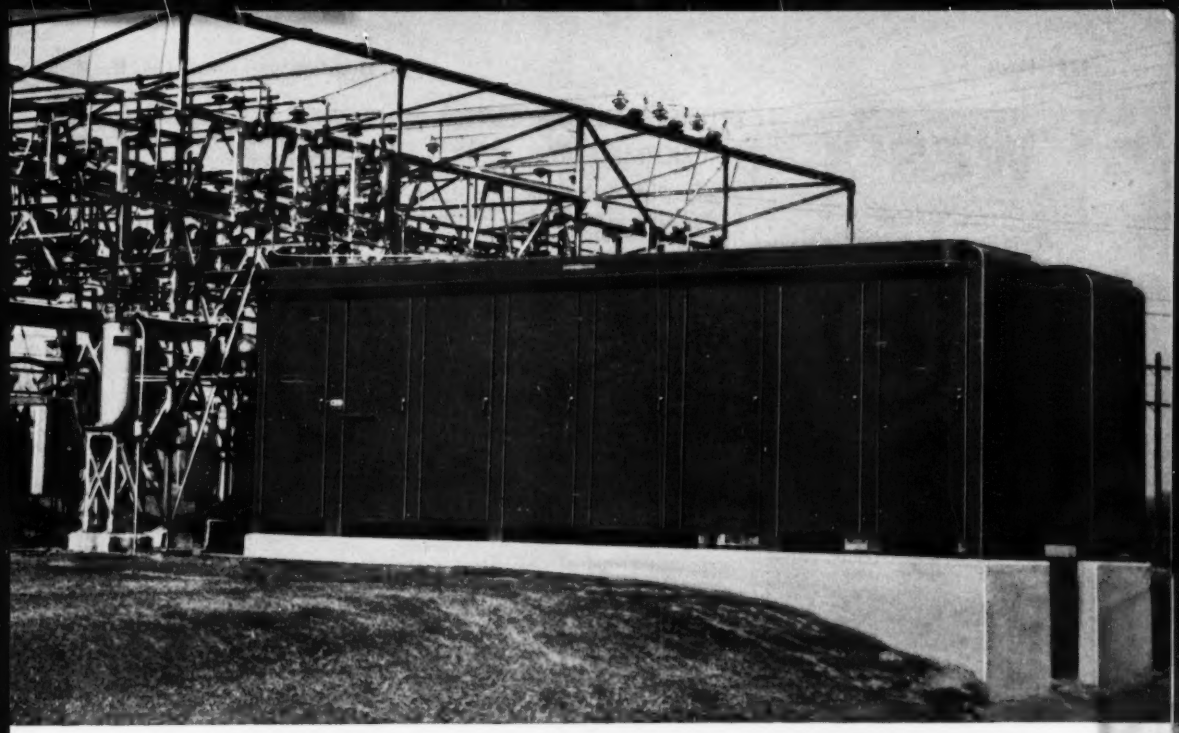

These G-E switched Pyranol capacitor equipments rated 5100 kilovars at 13,200 volts are installed on the system of an Eastern electric utility. *All* utilities today are finding it pays to install capacitor kvar, some as much as 50% of their peak load.

G-E switched capacitors prove life-savers as loads climb

Short deliveries on equipments. Priced less than $8.00 per kvar

Electric utilities in all parts of the country continue to find that capacitors provide the fastest, cheapest way to increase system capacity.

Where you already have installed a high percentage of fixed capacitors—or where your kilovar loading varies widely in any 24-hour period—you can profit by the use of *switched* capacitors. Automatically switched capacitor equipments can be provided at low cost. The G-E 5100-kvar 13,200-volt Pyranol* capacitor equipment illustrated here, with breaker and automatic control, is priced at less than $8.00 per kvar.

Switched capacitor equipments are available on short delivery. They can be installed in a matter of hours. They provide the least expensive method of releasing system capacity. Call your nearest G-E Sales Office or write for information on how capacitors can help you. Address Sec. 407-31, *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

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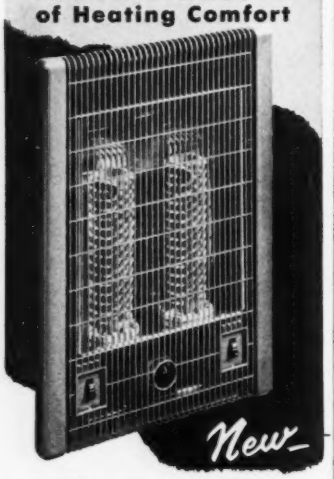

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DEFENSE PLANS ANNOUNCED FOR RICHLAND AREA

Specialized equipment needed to protect employees who produce plutonium at Hanford Works will be used to help safeguard the population of nearby Richland, Wash., from the after effects of an atomic blast, under civil defense plans announced for that area.

One of the most spectacular of the divisions making up the Richland civil defense organization is the technical defense division, whose responsibility it would be to determine the radiological effects resulting from an atomic attack. Equipped with sensitive monitoring instruments, members of the radiological monitoring group would inspect areas possibly contaminated by an atomic blast. Their reports, transmitted by a walkie-talkie, would be plotted on maps located in a central control center.

This group, composed of trained General Electric specialists, also would be responsible for manning radiological check stations to survey all personnel leaving disaster areas. Special detection instruments would indicate those contaminated with radioactive materials.

The specialists also will determine the dosage rates in highly radioactive areas, establish the length of time rescue groups may safely stay in these areas and check the rescue teams to prevent spread of radioactive contamination.

Electric Use Up, Cost Down in Oregon, Report Shows

Use of electricity by Oregon residential and rural customers of electrical utilities has increased five fold during the last ten years, George Flagg, Oregon public utilities commissioner reports. At the same time the price paid for electricity by these customers in 1950 was approximately 40% under the charge in 1940.

Number of residential and rural consumers increased 56% during the 10-year period and use per customer almost trebled. Average annual revenue from this classification increased from $37.45 to $71.74.

Commercial and industrial customers increased 43% during the decade and unit cost of their service decreased 21%. Average use in this classification was up 84%, with average revenue from each customer increasing from $266.54 to $387.97.

Oregon average consumption by residential and rural customers was 4,971 kwh in 1950 at a cost of 1.443c per kwh. The 1949 national average use by residential and rural consumers was 1,684 kwh at a cost of 2.95c per kwh.

Study Made on Electric Demand and Availability

The California State Utilities Commission has begun an investigation of the present and potential demand for, and availability of, electricity in the state.

The commission's inquiry, being made on its own motion, will study the "need for and propriety of the emergency modification of current rules and practices to facilitate the supplying of electric power."

It noted that defense needs and increased population have added greatly to the demand for electricity in the state.

The commission has ordered all electric utilities under its jurisdiction to supply information. Other electrical operations, such as municipal utilities, the Central Valley project, and REA co-ops, have been invited to submit data.

Arizona Power Authority Is Reorganized

The Arizona Power Authority, state agency for distribution of Colorado River power, has been reorganized under Governor Howard Pyle.

E. A. Thomas, Phoenix, is the new chairman. President of the Arizona Wholesale Supply Co., he replaces M. J. Dougherty, founder of the Power Authority Act and head of the agency since 1944.

Thomas has been associated with the electrical industry since 1919 and been in business in Phoenix since 1925. He is president of the state association of appliance dealers, and a member of the national board of governors for the appliance dealer's association.

Thomas and John H. Zellweger, Florence, are new members of the board. Other members are James Haskins, Cottonwood, vice-chairman; Dr. N. D. Houghton, Tucson, and Robert Fish, Phoenix.

The Power Authority handles state sale of power generated at Hoover, Parker, and Davis dams on the Colorado River. It has nearly 400 miles of transmission lines within the state of Arizona and sells to private and public utilities.

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NO REHEARING ASKED IN NEWPORT CASE

Although the town of Newport, Wash., has the legal right to construct a municipal lighting system, despite PUD opposition, no action is likely before June 1. (ELECTRICAL WEST, April, p 102.)

The Pend Oreille County PUD allowed the rehearing date of April 10 to pass without petitioning the state supreme court for a rehearing on the court's decision that two public bodies could operate competitive electric systems.

Mayor C. D. McKern pointed out, however, that four of five councilmen lost their bid for re-election and that it would be best to determine sentiment of the new council before proceeding with establishment of a municipal power system.

Payment in Power, Not Cash, Asked for Kootenay Water

Payment in power instead of cash was demanded by the British Columbia Federation of Agriculture for Kootenay water needed to feed the Libby Dam in Montana.

In a submission to the International Joint Commission on water power, BCFA said that only by payment in power "will it be able to encourage new industry in B. C. and have assurance that we will get the power when we need it."

In the meantime, because distribution facilities are lacking in B. C., the federation asked the right to sell the proposed B. C. power allotment back to the United States.

The brief pointed out that B. C. fruit and vegetable growers are now subject to unfair tariffs in competition with U. S. growers and that building of the dam will give U. S. competitors additional advantages.

● **FPC** has authorized Oakdale and South San Joaquin Irrigation districts to construct a reservoir and power project on the Middle Fork of the Stanislaus River in central California. The project will be constructed as part of the Beardsley development, for which FPC authorized a license in July 1949.

● **Municipal officials** at Tacoma, Wash., have agreed to pay Mason County $35,000 yearly for the next three years for natural resources the city utilizes in generating electric power at its Lake Cushman hydroelectric plant.

WAGE INCREASE GRANTED POWER COMPANY WORKERS

Pacific Gas and Electric Co. employees have been granted a 5.8% wage increase effective April 1 under one-year union contracts.

The increase brings the total wage boost to 10% since last September. At that time a 3% increase was granted and in January a 1% advance was made.

More than 16,000 employees will be affected, including those in supervisory and executive positions.

The contracts with the AFL International Brotherhood of Electrical workers and the CIO Utility Workers Union of America canceled existing contracts which had three or four months to go. The unions agreed to withdraw any further demands proposed during wage negotiations.

B. C. Electric Wins Lighting Sales Award

Top award for promoting lighting sales last year has been awarded by the Edison Electric Institute to the B. C. Electric Co. The award, won in competition with utility companies all over the continent, is a bronze plaque and $150 cash. It was won on the basis of customer calling, adequacy of lighting designs, follow-up work with contractors and use of advertising.

● **Employees** of the General Electric Co. at the Hanford Works have received the 1950 Safety Trophy of the Atomic Energy Commission for reduction in disabling injuries. They suffered only one injury for every 3,000,000 man-hours of work last year, for a frequency rate of 0.33 as compared to 0.84 in 1949. The severity rate for 1950 was .003 as compared to .030 the previous year.

● **Clark County PUD** of Vancouver, Wash., abandoned plans to refinance $900,000 in 2½% bonds when prospective purchasers failed to make an offer which would allow any appreciable reduction in interest. However, it did sell a $575,000 issue to the Ballard-Hessett Co. of Des Moines, Iowa, to build a warehouse-garage in Vancouver and Camas and a $150,000 street lighting system in Vancouver.

● **FPC** has authorized Mountain States Power Co., Albany, Ore., to issue and sell through competitive bidding $5,500,000 in first mortgage bonds and 150,000 shares of common stock, par value $7.25 per share.

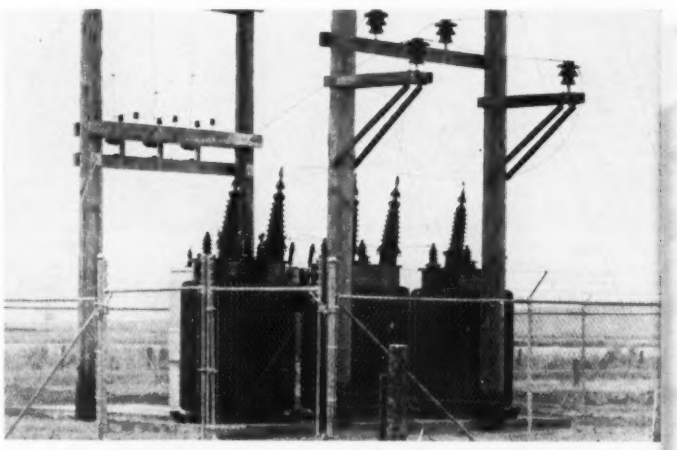
● **Grays Harbor PUD** of Aberdeen, Wash., has sold a $500,000 revenue bond issue to the National Bank of Commerce, Seattle, for general additions and improvements to its electrical system.

● **Western Electric** Co. submitted a low bid of $1,195,319 to the public utilities department at Tacoma, Wash., for furnishing four 50,000-kva transformers.

Partnership Wanted

Electrical Man desires to acquire an interest in an established electric motor repair service and contracting business, as an active partner. I can be a valuable asset, to assume responsibilities, with intimate working and technical knowledge of rewinding and rebuilding motors and industrial electrical equipment, automatic controls, and installation work, handling sales and customer relationships, with a well-rounded-out business experience and ability to get along in an organization.

Will make an initial cash investment of $15,000. Desire to locate on Pacific Coast or Southwest. Ernest Bernard, 10335 South Morgan St., Chicago 43, Ill. Cedarcrest 3-8040.



A recent Gardner transformer installation at Burns, Oregon — three 833 KVA transformers, 69000 volts to 7200/12470 Y volts — in a substation of the California-Pacific Utilities Company.

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GARDNER TRANSFORMERS GUARD PROFITS

MUNICIPAL SYSTEMS GO TO POSTCARD BILLING

Postcard billing systems have been inaugurated by the municipal lighting departments of Seattle and Tacoma, Wash., while Seattle also has gone to bi-monthly billing, except for large industrial users.

The Seattle change went into effect with acquisition by the city of Puget Sound & Light Co. properties, and is estimated to save $60,000 annually in postage alone. Puget Power customers had been getting their bills by postcard every other month and City Light decided not only to continue the practice but to extend it to its other customers. City Light used the bi-monthly postcard system during the war but abandoned it in peacetime.

The changeover gave Tacoma City Light a little trouble. The first card carried a Red Cross symbol and a reminder of its current fund-raising campaign on one side. Many patrons must have thrown the card away without noticing their bill on the other side, officials of the department think, since some called to inquire why they hadn't received a bill. The Tacoma change is estimated to save $23,000 annually in stamps and labor.

Lighting Rate Adjustment Postponed at Tacoma

Effective date of a controversial lighting rate adjustment has been postponed one year by the Tacoma, Wash., City Council.

Affecting mainly those who use electrical equipment for heating, the new rate provided that the lowest monthly bill would have to be at least 65% of the highest winter bill. Under the amended measure, minimum rate will be determined by the maximum rate between October 1951, and April 1952.

C. A. Erdahl, utilities commissioner, said the postponement was made to allow further study of the rate structure and to permit those using electric heating to convert to other types.

Electricity at Richland Will be Metered

Power consumers at Richland, Wash., will have their electricity metered after Sept. 1, under a program announced by the General Electric Co., which operates the town and nearby Hanford Works for the Atomic Energy Commission.

The program involves the installation of some 6,000 meters, to be done this summer under contract. Since Richland's wartime construction, electricity has been furnished on a flat-rate charge basis.

General Electric decided to install the meters when it found Richland residences are consuming 30% more electricity than in 1949, when current flat-rate charges were determined in relation to the various size houses. Rent for electrically heated houses will be reduced when the meters are installed. The rent previously has included electricity.

Utility Tax Bill Up 36% to All-Time High

Pacific Gas and Electric Co.'s 1950 tax bill increased 36% to an all-time peak of $54,703,068. Contributing to the 36% increase were generally higher tax rates and the addition during the year of several large new properties to local assessment rolls as a result of the company's great postwar expansion program.

By far California's largest property taxpayer, PG and E paid local property taxes totaling $25,764,353 to cities, counties, school districts, and special districts in 48 of the state's 58 counties. Federal and state income taxes and federal, state, and local taxes other than property taxes totaled $28,938,715.

Acquisition Boosts City Light Load

Monthly load of Seattle City Light has increased nearly 100,000,000 kwh with municipal acquisition of Puget Sound Power & Light Co. properties, the first operating report covering the merged systems shows.

The City Light report shows an output of 219,833,000 kwh in March, as compared with 120,039,000 kwh during the same month a year ago. The acquisition became effective March 5.

City Light statisticians estimate, however, that 137,032,000 kwh of the March output was handled over City Light lines, a gain of 14%, irrespective of the acquisition.

● **Contract** for constructing a hydroelectric development on the Mayo River in the Yukon Territory has been awarded to Northern Construction & J. W. Stewart Ltd., 1304 Hornby street, Vancouver. Cost is placed at approximately $1,000,000.

RATE INCREASE REQUEST CUT BY POWER COMPANY

California Oregon Power Co. has cut by $776,000 its rate increase request made last November. The new total requested is $1,043,000. The company explained that it revised earlier estimates of 1951 income when the figures were in for all of 1950. The original application was based on results of the first 10 months.

The company's annual report showed revenues of $11,000,000, with net income of $2,111,512 before dividends. Its rate of return for the year was 5.76%, down from 6.61% in 1949. Estimated rate of return for 1951, if the increases asked in the amended application had been granted from the beginning of the year, was 5.7%.

Arizona Edison Asks 8% Average Increase

Arizona Edison Co., operating in ten Arizona communities, has asked an 8% average rate increase affecting 48,000 users. The increase would apply for electric power, natural gas and water service.

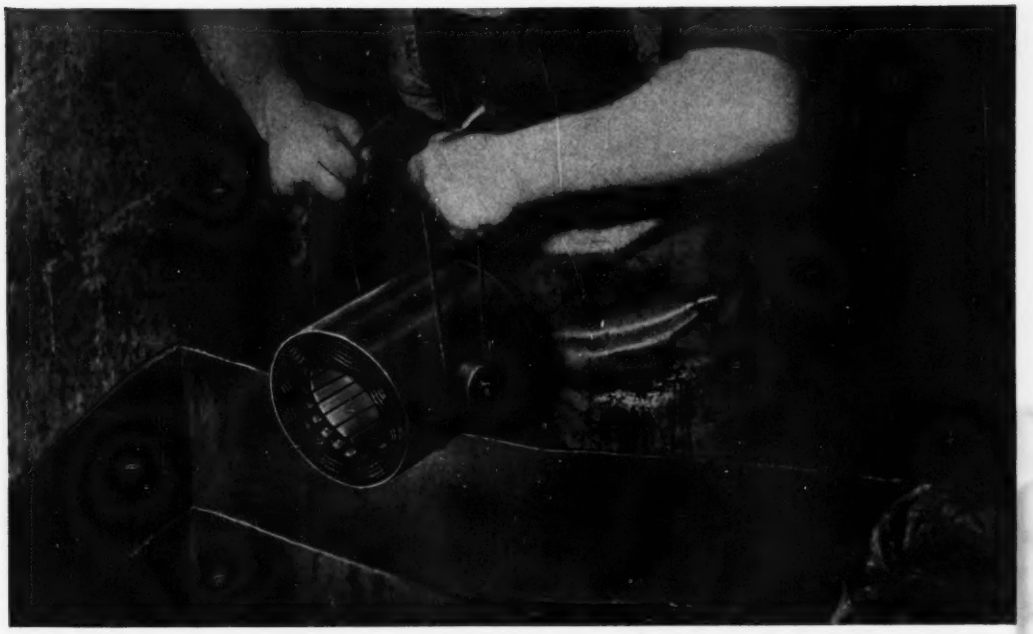
Reid Gardner, company president, told the Arizona Corporation Commission that the company has made an $8 million investment during the past four years in expansions and additions and has not had a corresponding increase in new income because of rising costs.

Gardner's brief said that the company's taxes have been increased 126% in five years; materials have climbed 135% and wages have almost doubled.

The first state utility rate study in Arizona is being conducted prior to a formal public hearing on the company's requested rate increase.

This is the first time in the history of the state that an advance investigation has been possible on a rate application to determine if it is fair and necessary. The recent legislature set up a $50,000 fund to finance the rate bureau.

● **New Mexico** State Public Service Commission has indicated that a rate increase would be granted to the Southwestern Public Service Co. which serves communities in eastern New Mexico between Clovis and Carlsbad. While the requested flat 10% increase will not be allowed, the commission said it would work out a schedule that will not put too much of the burden on residential and small industrial users.



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BUILT TO ORDER IN A HURRY!!

When you are installing or re-arranging—and need a special transformer to exactly match your requirements call on us. We can deliver in a week to 10 days.

Specify scattered transformers to eliminate duplicate conduit runs and save on power costs.

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NEWS ABOUT PEOPLE

MAECHTLEN

● **L. G. Maechtlen,** Western sales manager for Square D Co., recently was elected a vice-president and director of that organization. He started with the company more than 20 years ago as design engineer; was Los Angeles plant works manager and Los Angeles territory manager. He will continue as Western sales manager and assistant to J. H. Pengilly, vice-president and general manager of the Western division.

O. R. Doerr, left, Pacific Gas and Electric Co. vice-president, receives the Frank E. Watts Award for 1950, conferred on the company for its farm electrification program. The presentation was made at the annual sales conference of the Edison Electric Institute in Chicago last month by Neilson M. Mathews, general manager of the Farm Journal magazine, award sponsor

George A. Boring of Seattle (right) examines the low-cost capacitor exhibit aboard General Electric's "More Power to America Special" as L. M. Moyer, Portland, looks on. They are two of the 20 G-E engineers and sales specialists who came out of retirement to "pinch hit" as exhibit engineers during the final three months of the exhibit train's nation-wide tour. Boring, a veteran of 43 years with the company, was manager of G-E Supply Corp.'s Northwest District in Seattle. Moyer was assistant to the district manager, Northwest District, in Portland, when he retired after 30 years of service to the company

Retired Specialists Man Exhibit Train

Twenty retired General Electric specialists are now manning the company's "More Power to America Special" exhibit train, serving a three-month stint to relieve 20 young engineers needed for design and production assignments in G-E laboratories and plants.

The men will serve as exhibit engineers on the last lap of the train's year-long, 30,000-mile tour of the nation's industrial centers. The shift was made in San Francisco, prior to the train's swing through the Northwest.

Today's need for trained technical men is so critical that G-E might have been forced to end the train's tour if the 20 retired men had not volunteered to serve, according to Chester H. Lang, manager of the apparatus marketing division.

The retired specialists, with an average term of 41 years of service, include four winners of the Charles A. Coffin award, and have 94 patents to their credit.

● **Lawrence E. Judy** has resigned as manager of the Skagit County PUD at Mount Vernon, Wash., for "harmony and promotion of the best interests of the district."

magno-tronic

DUAL SILVER POINT — FULLY AUTOMATIC

FLUORESCENT STARTERS

—completely eliminate annoying blinking and flickering of dead fluorescent lamps!

GUARANTEED — FOR ONE YEAR!

This is a glow switch condenserless precision starter equipped with automatic thermal relay circuit breaker. The relay automatically removes the lamp from the circuit electrically when the lamp becomes deactivated and automatically resets upon interruption of the lamp circuit.

SIMPLIFIES—Replacement of defective lamp automatically recycles starter circuit. No buttons to push—no replacement of starter.

REDUCES COST—Magno-Tronic starters provide exact timing of electrode heating, preventing excessive loss of emission material, thus assuring maximum possible lamp life.

VERSATILE—Built to operate efficiently over an extended voltage and temperature range.

SP-15-20 For use with 15 or 20 watt lamps.

SP-30-40 For use with 30 or 40 watt lamps.

SP-85-100 For use with 100 watt lamps.

Manufactured under U. S. PATENTS

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Other Patents Pending

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Members of California Inter-Utilities Underground Standards Committee attend first annual meeting of the committee at San Bernardino. This committee was formed a little over a year ago to develop and standardize designs and to exchange ideas on construction and operation of underground systems. J. R. Kelley, Los Angeles Dept. of W & P, was elected chairman for the ensuing year. C. N. Parker, California Electric Power Co., is vice-chairman, and A. W. Cartmell, Pasadena L & P, secretary

● **Lauren W. Grayson,** formerly general manager and chief engineer of the City of Riverside Electric Department, was appointed general manager and chief engineer of the City of Glendale Public Service Department, effective April 1. He will be succeeded by **A. J. Kennedy,** former assistant general manager, at Riverside. Grayson, who had been with the City of Riverside for 25 years, has been very active in the California Municipal Utilities Assn. and the American Waterworks Assn.

● **C. F. Bowers,** president of Tri-State Supply Corp. of Los Angeles, recently made a field trip in the Southwest, attending the NISA convention in San Antonio.

● **H. J. Ashbee** has been named district sales manager for the Vancouver district of Amalgamated Electric Corp. Ltd., Toronto. He is a member of the board of management of the B. C. branch of IES and a director of the Vancouver Electric Club.

● **Appointment** of **Edward G. Hall** as engineering representative for its sales and engineering service department has been announced by the Lenkurt Electric Co. of San Carlos, Calif.

● **Robert G. Gallup,** formerly assistant head of the REA's power-planning staff, has become a member of the engineering staff of R. W. Beck & Associates, utility engineers, at Seattle. He is an engineering graduate of the University of Washington.

● **W. J. Rashleigh,** formerly in California with Sylvania, has been named sales manager of the newly formed Chicago division of that company.

L. N. McClellan (left), chief engineer, United States Bureau of Reclamation, Denver, was the recipient of the Gold Medal Award of the Colorado Engineering Council at a testimonial dinner in his honor recently. The medal is awarded by the society for distinguished service in the field of engineering and has been bestowed on only three others since it was originated in 1930. John McGowan is shown making the presentation on behalf of the council and the sponsoring society, the AIEE

● Appointment of **J. P. Jolliffe** as Bonneville Power Administration system security coordinator was announced by Administrator Paul J. Raver. Bonneville will work closely with all official state and local defense agencies in protection and restoration of power facilities in case of war emergencies or disasters, Raver said. Jolliffe will be responsible for all defense and security measures to protect operations and transmission facilities of the U. S. Columbia River system. Jolliffe joined Bonneville in 1938 and was progressively in charge of transmission line construction, maintenance, power dispatching and operations. Since 1946 he has directed all power system operations.

● **R. W. Kimberlin,** Graybar San Francisco district manager, has been elected to that company's board of directors. A native Californian, he was district manager at St. Louis for more than five years before he became San Francisco district manager in January 1950.

● **S. A. Payette,** manager of the Clallam County PUD at Port Angeles, Wash., since 1945, has resigned to accept an appointment with the Federal Defense Electric Power Administration.

● **Carl Miller,** until recently manager of the Lewis County PUD at Chehalis, Wash., has been appointed to a similar position with the Clallam County PUD at Chehalis, Wash.

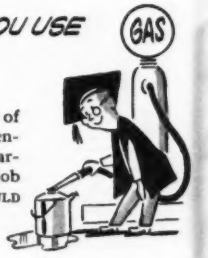
PREPARE FOR TODAY'S CHANGING DEMANDS WITH THESE

G-E WIRING FACTS!

1. WHERE DO YOU NORMALLY LOCATE GENERAL ELECTRIC REMOTE-CONTROL MASTER SELECTOR SWITCHES?

This new multi-purpose G-E master selector switch gives homeowners control of up to nine different lights or outlets from a single point. But do you know WHAT LOCATIONS ARE RECOMMENDED FOR MASTER CONTROL SWITCH INSTALLATIONS?

2. WHAT WIRE SHOULD YOU USE IN LOCATIONS EXPOSED TO GASOLINE?



Until now, this problem required the use of heavy, lead-sheathed cables. Today, General Electric's new lightweight, hydrocarbon-resistant wire helps you do the job efficiently and economically. WHAT SHOULD YOU SPECIFY?

3. WHAT IS THE BEST PROTECTION FOR MACHINE TOOL LEADS THAT ARE SUBJECT TO VIBRATION?

Rigid protection used for this purpose is often bulky and fails to provide the necessary "play." There is a simple solution. But, DO YOU KNOW WHAT'S BEST?

4. WHY DO AVA POWER CABLES PACK MORE CURRENT INTO EXISTING RACEWAYS?

More current per raceway is a big feature of G-E Deltabeston* AVA cables. Capable of operating at high temperatures because they are insulated with heat-beating asbestos and varnished cambric—they can be used at normal ambient temperatures to crowd more current into raceways. HOW DO THEY DO IT?

5. HOW DO YOU AVOID "ROCKING" WHEN YOU INSTALL A SWITCHBOX?

The new G-E Levelock switchbox solves the problem of rocking during installation—speeds rough wiring on any job. HOW?

Answers

1. ☐ The most popular locations for the master selector switch are in the master bedroom and at entrance doorways. But, customers can specify its installation in any convenient spot.
2. ☐ General Electric Geotrol Type TW wire is the full name of this new gasoline-and-oil resistant wire.
3. ☐ Use G-E flexible steel conduit to simplify vibration-proof installations in close quarters.
4. ☐ Deltabeston AVA cables can carry as much as 64% more current than ordinary cables with 60C rating, because two layers of asbestos insulation permit (1) higher operating temperatures and (2) more current per conductor.
5. ☐ The G-E Levelock switchbox has four leveling projections. It can't rock or tilt.

*Registered Trade Mark of General Electric Company

FOR FURTHER INFORMATION

on any General Electric wiring materials, see your G-E Construction Materials distributor, or write to Section K54-525, Construction Materials Department, General Electric Company, Bridgeport 2, Conn.

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R&S SWITCHES
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Complete Line
EXPLOSION-PROOF
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Meet ALL Standards PLUS

FLEXIBILITY of outlet sizes and locations, and on the job conduit drilling.
INTERCHANGEABLE gang form assemblies and combinations with other EFS Push Button Stations, Pilot Lights and Manual Starters, etc.
SURFACE AND FLUSH mounting.
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SILICONE COATED STAINLESS STEEL SHAFTS insure permanent free operation under all conditions of temperature and corrosive vapors.
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DEPENDABLE OPERATION insured by 48 years of design and manufacturing experience.
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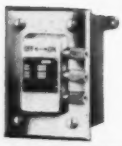

A8

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Precision-Built Electrical Equipment
125 BARCLAY STREET, NEW YORK 7, N. Y.

FOSTER

● **John H. Foster** has been appointed an electrical supervisor for the engineering and service department of Westinghouse Electric Corp., with headquarters at San Francisco. His duties will consist primarily of supervising erection and servicing of electrical equipment for industrial use in the northern California area.

Deaths

● **W. R. Bonnycastle,** British Columbia hydro and consulting engineer and past president of the Professional Engineers Assn. of B. C., died recently in Riverside, Calif. Bonnycastle did preliminary work on the Ruskin and Stave Falls projects for B. C. Electric Co., for a time was a private consulting engineer and later was consultant for projects on Indian River and Bridge River. During World War II, he was engineer for the department of munitions and supply.

● **Robert W. Muller,** 60, manager of the Humboldt Division, Pacific Gas and Electric Co., died in San Francisco April 16. Mr. Muller had been with PG and E since 1912.

● **Ira S. Davisson,** who directed the municipal lighting system at Tacoma, Wash., from 1918 to 1940 as commissioner of public utilities, died April 22 at the age of 90. Cushman Dam was built and enlarged during his term of office and plans were made for the construction of Alder Dam, built after his retirement.

● **Corydon H. Crowley,** 51, associate electrical engineer in the Seattle, Wash., city building department, died March 24 while on a fishing trip in eastern Washington.

WESTERNER 'WANTS WEST'

Staff Electrical Engineer seeks West Coast position with operating company or engineering firm. Twenty years administrative and technical experience eastern U.S. in all phases system planning and design, application of generation transmission distribution equipment. U. Calif. graduate.

Write Electrical West, Box 262 68 Post St., San Francisco 4, Cal.

600-VOLT ELECTRIC UTILITY WIRE, 3300 feet to reel, 2 conductor No. 14 gauge, black mica, braided cover, heavy rubber insulated, 7 strand tinned copper.
IRREPLACEABLE TODAY'S MARKET
U. S. Government replacement cost $250.00 per reel. Our price, F.O.B. N.Y. $66.00 per 3300 ft. reel. Wire Funds to Chase National Bank, N. Y., payable against R.R. or Truck bill of lading and certified invoice, for your purchase! Immediate shipment.
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WANTED FOR HAWAII

WANTED—Manufacturers Representative in HAWAII for old and well known manufacturer, to sell staple wiring and line construction materials on an agency commission basis to electrical distributors, wholesalers and public utilities. **Write Box 261, c/o Electrical West, 68 Post St., San Francisco 4, Calif.**

MANUFACTURERS DIRECTORY
19th Edition
April 1951

This handy guide to Western States sales outlets and service facilities contains:

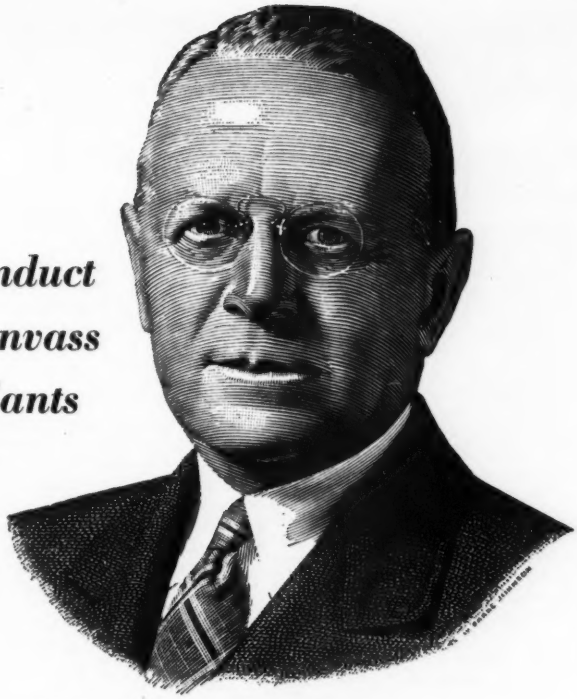
(1) Directory of Manufacturers listing their principal agents in this area.
(2) Where-To-Buy In the West listing products and who sells them in the West.
(3) Directory of Appliance Service and Repair Stations.
(4) Directory of Manufacturers' Representatives.

Published annually as a supplement to the April issue by

ELECTRICAL WEST

68 Post Street, San Francisco 4, Calif.

...*"It was easy to conduct a person-to-person canvass at all company plants and offices"*



ROY A. HUNT
President, Aluminum Company of America

"Our employees like the Payroll Savings Plan for U. S. Savings Bonds. It was easy, therefore, to conduct a person-to-person canvass at all company plants and offices.

"I believe every company which promotes the systematic investment in U. S. Savings Bonds in this way provides a highly desirable service for its employees and at the same time gives practical support to an important national effort."

Yes, it *is* easy to conduct a person-to-person canvass of your offices and plants to ascertain who wants to help America and build for his or her security by the systematic purchase of U. S. Defense Bonds through the Payroll Savings Plan. Have you conducted a person-to-person canvass in your plant?

If you haven't, here are the three easy steps:

- Phone, wire or write to Savings Bond Division, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C.
- Your State Director, U.S. Treasury Department, will contact you or the executive you designate to conduct the canvass and tell you exactly how to proceed. He will furnish posters, pay envelope stuffers, application blanks and other aids.
- All you have to do is to see that every employee in your company is handed a Payroll Savings Application and given an opportunity to make his or her own decision. No pressure is needed.

Simple as the plan is, it works — to the benefit of employees, the company and America. In the last six months approximately 4,000 more companies have installed the Payroll Savings Plan for their employees. Approximately 600,000 working men and women have joined the millions of smart savers already on the Payroll Savings Plan. In plant after plant, employee participation has jumped to 70%, 80% — even 90% because, as Mr. Hunt so aptly puts it, "employees like the Payroll Savings Plan."

Make it easy for *your* employees to help themselves, their Country and their company by the systematic purchase of U. S. Savings Bonds — Defense Bonds now, because they are an important factor in combating inflation and building a stronger America.

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ELECTRICAL WEST

NOTES ON THE TRADE

New Buildings Will House Hanford Works Facilities

Laboratory facilities at Hanford Works, now housed in temporary frame buildings, some 30 miles apart, will be combined in seven buildings costing a total of $14,500,000 under a program announced by the General Electric Co., which operates the plutonium factory for the U. S. Atomic Energy Commission.

One of the four key structures, the Health Instruments Control & Development building, already is under construction by the Sound Construction & Engineering Co. of Seattle under a $1,154,203 contract. Plans are in preparation for three other buildings, for radiochemistry, radiometallurgy and pile technology, with completion of construction scheduled for next year.

● **J. J. Marshall** Ltd. has been appointed distributor in British Columbia for the Maytag Co. Ltd., according to announcement by G. R. Sparks, general sales manager for the company, which has its washing machine factory and Canadian head office at Winnipeg, Manitoba. The Marshall company has offices at 656 W. Broadway, Vancouver, with a branch at 2814 Heath Drive, Victoria, B. C. J. J. Marshall is president of the company.

● **General Controls Co.** of Glendale has appointed **Fred H. Angier** as district manager for its Philadelphia and Baltimore factory branch offices.

● **Robert L. Kempton** has been named San Francisco district manager of Edwards Co., manufacturer of electrical signaling, communication and protection equipment. He has been Chicago district manager for the past two years.

● **Sunroc Co.**, maker of electric water coolers and purifiers, has moved its West Coast offices from 2331 Westwood Blvd., to 12810 Venice Blvd., Los Angeles, according to Paul H. Walter, Western sales manager.

● **George Magnes** announces the forming of the new manufacturers representative business, the Magnes Co., at 725 Second St., San Francisco 7. Lines represented are the Narragansett Wire Co. of Pawtucket, R.I. (building wires); Winstead Division, Hudson Wire Co. of Winstead, Conn. (magnet wire); Haartz-Mason Co., Watertown, Mass. (tapes), and Dossert Mfg. Co., Brooklyn, N.Y., makers of pressure solderless connectors and industrial fittings.

● **Westinghouse Electric Corp.** has published a comic book *How Does It Work?* for its school service department which illustrates the way various physical principles operate. By analogies and illustrations it serves to acquaint youngsters with atomic power, jet propulsion, principles of electric lighting, power, motors, radio and television.

● **An educational program** to aid in the rapid training of industrial personnel in selection and application of modern electric motor drives has been announced by General Electric Co. It is the fifteenth in the company's "More Power to America" series; consists of a motor selection and application course made up of nine 35-mm black and white slide films, student review booklets and instructor's manual. The kit is packaged in a carrying case and sells for $100.

● **The wholesale division** of the Columbia Electric and Mfg. Co. of Spokane won fourth place in a nationwide sales contest conducted by Columbia Records Inc. Personnel of the Spokane firm's record department, headed by William Bigelow, will share in a $500 award.

● The **Altec Lansing** Corp. has opened a new plant in Beverly Hills to supplement production facilities at Los Angeles and New York.

DIRECTORY ADDITIONS

Manufacturers' Directory

GRAYBAR ELECTRIC CO., San Francisco address should be 1750 Alameda St.

CHAMPION LAMP WORKS, 600 Broad St., Lynn, Mass., add—represented by Panama Lamp & Com'l Co., 700 E. 1st St., Los Angeles, and 568 1st Ave. S., Seattle.

MARVEL FLUORESCENT MFG. CO., 1401 Clinton St., Hoboken, N. J., add—Panama Lamp & Com'l Co., 700 E. 1st St., Los Angeles, and 568 1st Ave. S., Seattle.

SAFETY ELECTRIC CO., 53 W. Jackson Blvd., Chicago, Ill., add—Panama Lamp & Com'l Co., 700 E. 1st St., Los Angeles, and 568 1st Ave. S., Seattle.

SUPREME LIGHTING CO., 1630 S. Essex, Los Angeles—represented by Panama Lamp & Com'l Co., 815 Howard St., San Francisco; 700 E. 1st St., Los Angeles, and 568 1st Ave. S., Seattle.

M. BLACK MFG. CO., 300 N. 3rd St., Philadelphia, Pa.—represented by Panama Lamp & Com'l Co., 815 Howard St., San Francisco; 700 E. 1st St., Los Angeles, and 568 1st Ave. S., Seattle.

EJS CORP., 945 E. Pico Blvd., Los Angeles—represented by Panama Lamp & Com'l Co., 700 E. 1st St., Los Angeles, and 815 Howard St., San Francisco.

FAST & CO., John E., 3141 N. Crawford Ave., Chicago 41, Ill.—represented in Los Angeles by R. E. Cunningham & Son, 628 Edison Bldg.

Appliance Service

RADIO CORP. OF AMERICA, RCA Victor Div., Camden, N. J.
Service Stations:
Phoenix: Midland Spec. Co., 233 S. 11th Ave.; Radio Parts of Arizona, 36 W. Madison St.
Avalon: Wayne R. Seevers, 607 Crescent, Box 653.
Bakersfield: Valley Radio Supply, 716 Baker St.; Jack C. Arbuckle, 417 E. 19th St.
Hollywood: Hollywood Radio Supply Inc., 5606 Hollywood Blvd.
Long Beach: Fred S. Dean Co., 969 American St. (13)
Los Angeles: Henry Radio Shop, 11240 W. Olympic Blvd.; Leo J. Meyberg Co. Inc., 2027 S. Figueroa St. (15); Radio Equipment Dist., 312 W. Pico Blvd. (15); Radio Specialties Co., 1956 S. Figueroa St. (7); Radio Television Supply Co. Inc., 341 W. 18th St. (15); Shelley Radio Co., 2008 Westwood Blvd. (25); United Radio & Electronic Co., 1356 S. Flower St.; Universal Radio Supply Co., 1729 S. Los Angeles St. (15)
Oakland: W. D. Brill & Co., 198 10th St.; Electric Supply Co., 149 12th St. (7); E. C. Wenger Co., 1450 Harrison St.
Pasadena: Dow Radio Inc., 1759 E. Colorado St.
Sacramento: E. M. Kemp Co., 1115 R St. (14); Dunlap Wholesale Radio Co. Inc., 2001 O St.; Sacramento Elec. Supply Co., 1219 S St.
San Diego: Western Radio & Tele. Supply Co., 1415 India St. (1)
San Francisco: Leo J. Meyberg Co. Inc., 33 Gough St. (1); San Francisco Radio & Supply Co., 1284 Market St.; Western Theatrical Equip. Co., 337 Golden Gate Ave. (2); Wholesale Radio & Elec. Supply Co., 140 9th St. (3); Zack Radio Supply Co., 1426 Market St. (2)
San Jose: Frank Quement Inc., 161 W. San Fernando St.
Santa Barbara: Channel Radio Supply Co., 434 State St.
South Gate: Mac's Radio Supply, 8320 Long Beach Blvd.
Stockton: Dunlap Wholesale Radio Co. Inc., P.O. Box 1109, 27 N. Grant St.
Boise: Craddock's Radio Supply, P.O. Box 297, 1522 State St.
Billings: Electronics Supply Co., 214 11th St., W.; Northwestern Auto Supply Co., 420 N. Broadway
Butte: Smitty's Electronics, 126 W. Broadway
Las Vegas: Metcalf's Radio Supply, 819 Ogden St.
Astoria: Radio Electronics Co., 9th and Commercial
Portland: Central Distributors, 1131 S. W. Washington; Harper-Meggee Inc., 15th and Irvine Sts.; Northwest Radio Supply Co. Inc., 717 S.W. Ankey; United Radio Supply Inc., 22 N.W. 9th St.
Ogden: Ballard & Carter, 2428 Grant Ave.
Salt Lake City: Flint Dist. Co., P.O. Box 1470; Standard Supply Co., 531 S. State St., P.O. Box 2105
Seattle: Harper-Meggee Inc., Republican and Terry; Associated Industries, 1752 Rainier Ave.; Modern Theatre Supply Inc., 2400 3rd Ave.; Radio Products Sales Co., 1214 1st Ave.; Herb E. Zabrist Co., 2125 Westlake Ave.
Spokane: Harper-Meggee Inc., N. 734 Division St.
Tacoma: Wible Radio Supply, 909 Tacoma Ave. So.

SUNROC CO., Glen Riddle, Pa.
(Sunroc water coolers and purifiers)
Branch office: 12810 Venice Blvd., P.O. Box 12456, Los Angeles 64 (service for Nevada, Oregon and Utah)
Distributors:
Tucson: Keenan Pipe & Supply Co., 101 S. 1st St.
Los Angeles: Keenan Pipe & Supply Co., 2112 E. 27th St.
Sacramento: Slakey Bros., 1400 N. C St.
San Diego: Industries Supply Co., 345 4th Ave.
San Francisco: Water Filters Consolidated, 1806 Market St.
Santa Fe: Santa Fe Builders Supply Co., P. O. Box 899
Seattle: H. D. Fowler Co., 9th Ave. S. & Lane St. (For Idaho and Montana also)
Factory service only for Colorado and Wyoming

TECHNICAL APPLIANCE CORP., Sherburne, New York
(Taco Antennas)
Representatives:
Los Angeles: Lee H. Owens Co., 2331 W. Washington Blvd.
San Francisco: David H. Ross Co., 1355 Market St.
Salt Lake City: Gates Co., 200 S. Main St.
Seattle: J. J. Backer Co., 2321 2nd Ave.

Once more, RCA leads the field! This time, with new rectangular picture tubes which require no focusing coil or focusing magnet . . . thus effecting important savings in critical materials.

The currently used magnetic focus in TV sets requires coils and magnets containing the metals cobalt and copper . . . both on the Government's restricted list.

To meet the shortages, RCA engineers have developed improved electrostatic focusing for wide-deflection-angle TV tubes—eliminating need for a focusing magnet or coil. Result: The new RCA kinescopes—which not only make possible savings in critical materials, but introduce advantages that destine them to become industry's most widely used picture tubes.

Such advantages, for example, as: (a) An improved electron gun which provides excellent uniformity of focus over the entire picture area, and is so designed that the focusing electrode takes negligible current—permitting voltage for the electrode to be supplied easily and economically; (b) Focus automatically maintained with variation in line voltage and adjustment of picture brightness; (c) Simplification of tube installation and adjustment for optimum performance.

When RCA produced its outstanding Image Orthicon, "eye" of the television camera, it called upon the superlative Driver-Harris radio alloy Nichrome* V to provide 95% of the metal components of the tube. Now, in the case of the kinescopes, a Driver-Harris produced alloy fills a need.

Here are typical examples of how Driver-Harris stands ready to serve all industry with alloys necessary for new or standard applications.

During the present emergency, of course, strategic materials and the alloys made from them are on strict allocation. However, we shall be glad to make recommendations based upon your specific needs, and serve you to the best of our ability.

Makers of world-famous Nichrome and over 80 other alloys*
for the electronic, electrical and heat-treating fields

Driver-Harris Company

HARRISON, NEW JERSEY

Western Representative: ANGUS-CAMPBELL, INC.
1114 Valencia St., San Francisco 449 San Pedro St., Los Angeles

*T.M. Reg. U.S. Pat. Off.

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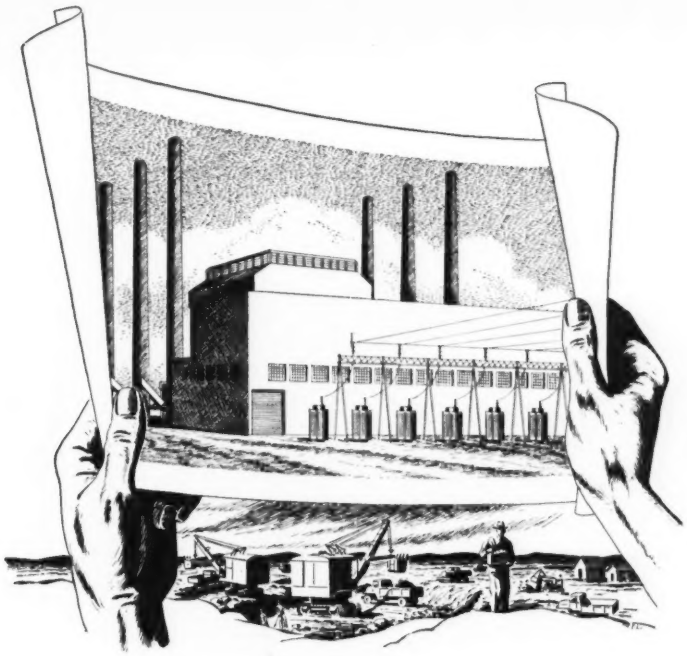
PROFILES

S. W. Scott (left, above) recently was made Graybar Pacific district manager, with headquarters in Los Angeles. He succeeds H. L. Harper. R. W. Kimberlin (right, above) Graybar Electric's San Francisco district manager, has been elected to the organization's board of directors

W. C. Mullendore, president, and W. L. Phillips, Whittier district manager of Southern California Edison Co., are shown (center) at ceremonies celebrating installation of the company's one millionth electric service meter. A special goldplated meter was used for the occasion by Edison

Western representatives of Day-Brite Lighting Inc. at the company's annual sales conference in St. Louis last month. Left to right: Matt A. Cabot, San Francisco; R. M. Camnitz, Portland; S. P. Russell, San Francisco; J. R. Ray, Denver; C. D. Belt, Denver; M. J. Rudman, Los Angeles; Allen Humphries, Albuquerque. Belt, Ray and Humphries are with the C. D. Belt Co. of Denver. E. B. Bomar, Phoenix, and Mark Bryner, Salt Lake City, attended the conference but were not present when the photo was taken



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Lots of money—more than seven hundred million new dollars—has been put to work since 1945 to build added facilities to supply electricity and gas in this fast-growing area. The new capital needed has been provided by vast numbers of people who invested in P. G. and E. securities.

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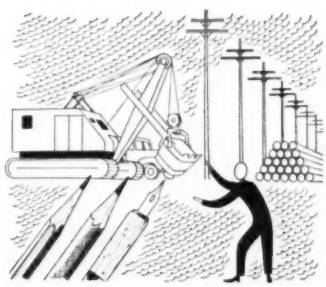

Tons of supplies—everything from pencils and paper to shovels and trainloads of steel—are needed every year. Whenever possible, they are bought locally. It takes a mountain of material to carry out history's biggest power building program—and to deliver abundant power at low rates.

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